

THE CANADIAN LESSON BOOK
ON
TEMPERANCE AND LIFE

FOR THE USE OF TEACHERS

ISABEL McCORKINDALE

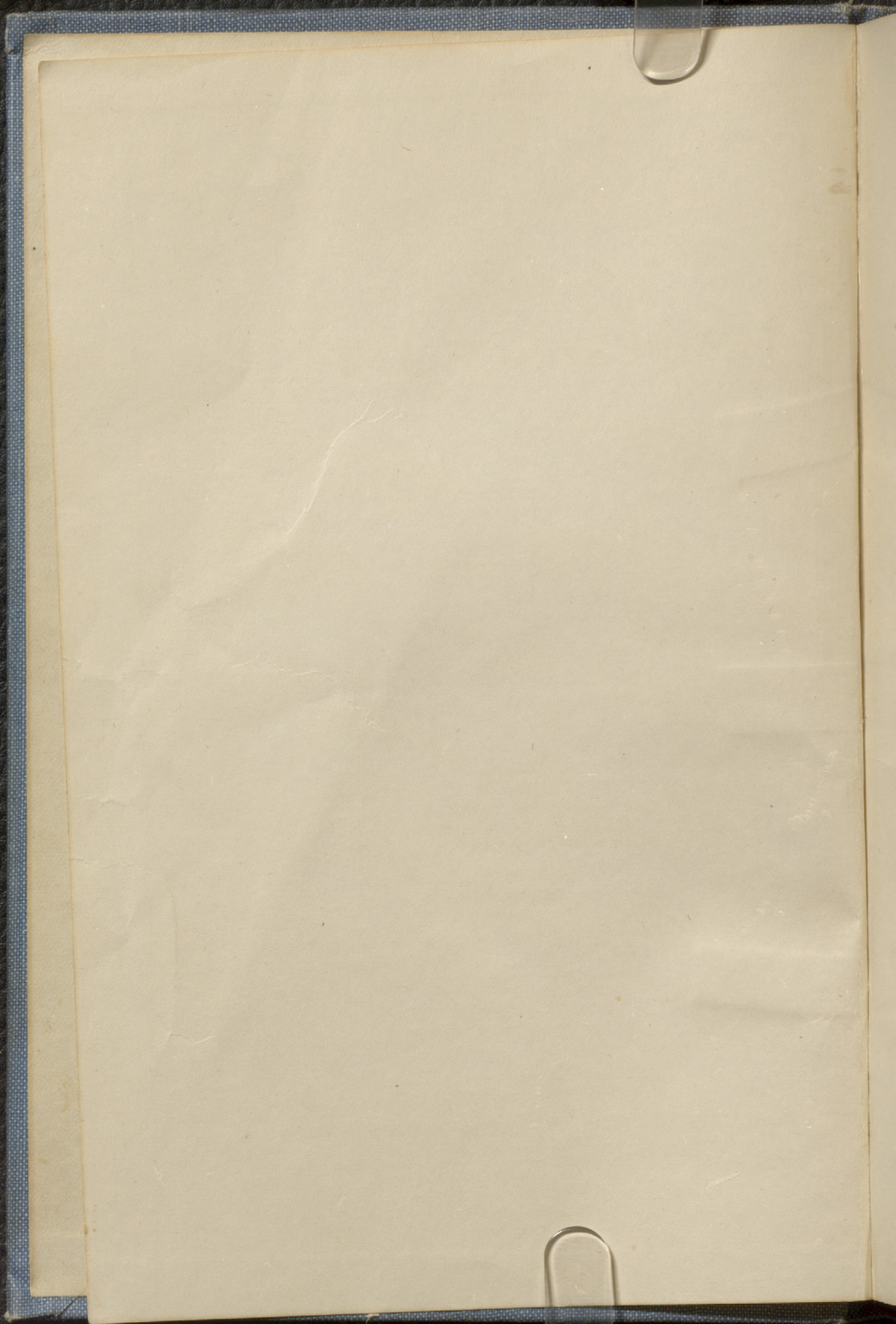
DOMINION SCIENTIFIC TEMPERANCE COMMITTEE



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INTRODUCTION

Always in the mind of the teachers of youth there has been the desire to enable them to realize their possibilities. When the author of Genesis wrote, "And God said let us make man in our image and after our likeness, and let them have dominion," He placed a noble ideal before the Hebrews. When centuries later, Paul wrote to young Timothy, "Study to show thyself approved unto God, a workman that needeth not to be ashamed," he was calling him to make the most of life. When the Greeks placed over the lintel of the Temple at Dodona in letters of gold, "Know Thyself," and when the Roman ideal became "A sound mind in a sound body," they were possessed with the same ideal.

In modern scientific times the demand for efficiency and the increased complexity of life has caused the problem to take a social, as well as a personal aspect. Disraeli wrote, "Public health is the foundation on which reposes the happiness of the people and the power of the country. The public health is the first duty of the statesman." The need for the study of everything that in any way influences the health of the individual or of society, has greatly developed in our day. In Canada, in our public schools, we have had such text-books as: "How to be Healthy," by Halpenny and Ireland; "Primer of Hygiene," by Ritchie and Caldwell, "Primer of Physiology," by Ritchie; "Human Physiology," by Ritchie; "The Ontario Public School Health Book," by Fraser and Porter. In England the Board of Education has issued a syllabus of lessons for use in schools entitled, "The Hygiene of Food and Drink."

In all of these the treatment of the action of alcohol on the human organism has been but one of several subjects. At a time when the need of a careful exposition of the intrinsic features of the alcohol question is felt by all thinking people, we consider ourselves very fortunate in having Miss Isabel McCorkindale give us a text-book in which we have the benefit of her experience as a teacher and her careful study of modern scientific authors on this subject. Her book is a new and enlarged edition of "Twelve Temperance Lessons" used as a text-book in the public schools of Queensland, Australia. Whilst supplementary to the school books on health, it is written that it may be used as a text-book by that larger body who desire accurate scientific knowledge on this important subject. If it helps someone to find the way to a better and nobler use of their gifts, and to render a richer service to their fellows, the purpose of its author and of this Committee will have been realized. "There is in human affairs one order which is best: that order is not always the one which exists, but it is the order which should exist for the greatest good of humanity. God knows it and wills it: man's duty it is to discover and establish it."

W. W. PECK, *Secretary*,
Dominion Scientific Temperance Committee

FOREWORD

To the teacher is given the task and privilege of preparing childhood and youth for the making of a life and, through the individual, the making of a nation.

Education, in modern days, is expected to be practical. The years at school will not make a life, but they should provide the keys that will unlock the doors to wider knowledge and truer understanding of the things worth while. The modern Temperance lesson will teach more than scientific facts concerning alcohol; it will help to develop the desire to keep brain and body fit for service, it will teach citizenship and the community spirit, and a true appreciation of the scholar's best gifts. Not negative, but positive; not withdrawing from, but giving to life.

The use of alcohol as a beverage is imbedded in superstition and custom. It is the child's right that he should receive the knowledge that will help him to see this custom in a sane scientific light, free from prejudice. There is a very grave need for teachers to become familiar with modern methods of teaching the Temperance lesson. It should be presented from a positive rather than a negative standpoint; and as a health lesson rather than a discourse on the pathological effects of alcoholism. This cannot be done from observation, or knowledge picked up in a desultory manner. It is necessary to connect the lesson with the facts of life, and it is hoped that the following pages will be suggestive of such a scheme of lessons.

The Temperance lesson can be the most fascinating of subjects. It has the distinct advantage of being as-

sociated with life. It gives opportunity for simple lessons on laws of health, natural history, elementary chemistry, physiology and psychology, all of which opens up to the mind of the pupil a world of interesting things. It will be seen at once the value there is to the child in getting a knowledge of alcohol as a drug, before he becomes familiar with the old customs and traditions which, in the light of modern science, appear so absurd; such as that of drinking a person's health in what is known to science as the friend of disease.

The child follows the teacher in the study of the chemistry of alcohol, as in number two lesson. In later life, memory will always carry the picture of the fruits of the earth in their fresh, wholesome state, protected by nature from the yeast germ; of how alcohol is obtained by their decomposition, and the power of the poison to destroy the first life with which it comes in contact; this association of ideas will always remain.

It is wise to avoid giving a number of unrelated scientific facts. An unrelated fact is usually a fact lost to memory and, therefore, useless. It does not conduce to straight thinking. It is far more important to bring the child's mind to a starting point, to which he can return with the fruits of later experiences. A fact related to some known object is a magic key that opens many doors.

"To him that hath shall be given" is simply a statement of a universal law. Truth thus presented will help a new generation to grow up with "the light of knowledge in their eyes," and so be better able to free themselves from the fallacies and superstitions concerning alcohol, that older generations find it so difficult to abandon. It will help young people to have a saner outlook on the question, and fit them to judge for themselves regarding its

customs. A boy may not be afraid of becoming a drunkard; he may not be concerned whether he will live an extra five years or not, but he does care about being at his best.

Many teachers are too busy to study text-books on this subject. It was, therefore, felt that a book of lessons, prepared with suggestions for simple illustration, would supply this long felt need, and that busy teachers would be glad to have the material ready to hand with the twelve charts. The lessons have been prepared from recognized standard text-books.

For the teacher who desires to study the subject more thoroughly, I know of no better text-book than "Alcohol and the Human Body," by Horsley and Sturge (Macmillan & Co.). This is a comprehensive work, which covers almost every phase of the subject that the teacher may desire to study. We also recommend "Alcohol and Self-Control," by Dr. W. A. Chapple (Richard James, Ivy Lane, Paternoster Row, London, England), and "Alcohol in Medical Practice," by Dr. Courtenay C. Weeks.

Toronto.

ISABEL McCORKINDALE.

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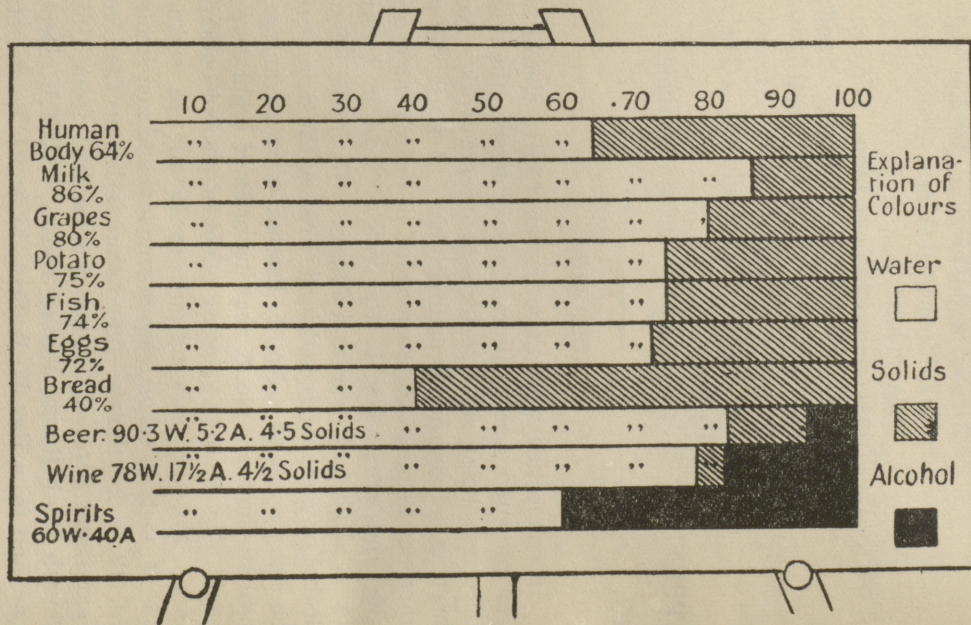
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CHARTS

In connection with these lessons twelve charts have been prepared, one to illustrate each lesson, the size of the charts being suitable for school-room work. No. 1 chart is a picture of animals. No. 2 illustrates the difference between the food value in unfermented grape juice and wine. No. 3, the loss of food in brewing. No. 4, alcohol, its uses and abuses. No. 5, the effect of alcohol on cress seeds and food. No. 6, the defenders of the body's health. No. 7, lists showing advantage of total abstinence. No. 8, showing order of brain development. No. 9, tests showing effect of alcohol on skilled work. No. 10, safe stimulants to use in sickness. No. 11, tests in scholarship of smokers and non-smokers. No. 12, a lighthouse—prevention is better than cure. Charts and book of lessons can be had from United Church Book Room, Wesley Bldgs., W.C.T.U. Depository, and from Rev. W. W. Peck, M.A., LL.B., Secretary Dominion Scientific Temperance Committee, 24 Bloor Street East, Toronto.

Blackboard Lesson No. 1—



LESSON NO. 1
WATER AND HEALTH
TEACHERS' NOTES

CHART No. 1—"Water."

Object Lesson—Seeds placed in cotton wool, some having been moistened with water only, and some with water to which has been added a small quantity of alcohol. Note difference in growth.

Experiment—Have two small glass jars; in one put alcohol and in the other water. Suspend a piece of loaf sugar in each of the liquids and watch results. The sugar will dissolve in the water, but will remain unchanged in the alcohol.

Memory Verse—

And brim your cups with nectar true,
That never will make slaves of you.

—Russell Lowell.

("The Two Glasses," by Ella Wheeler Wilcox, might be recited for this lesson.)

Scientific Thought—"The greatest and noblest pleasure which men can have in this world is to discover new truths, and the next is to shake off old prejudices."

Aim—To teach that water is nature's drink and is necessary to keep the body healthy and strong.

THE LESSON
THE ANIMAL KINGDOM

(Have pictures of birds and animals. This makes it possible to give a temperance and hygiene lesson to the juniors.) The tiny canary in the home, and the great

eagle soaring above the mountain peaks—What do they drink? The domestic animals, the dog who must use his strength to draw the sled over the snow—the horse as he pulls his heavy load up the hill—they must use a drink that helps them to be strong—What is it? The wild animals of the jungle, the lion and the tiger as they follow their prey—the elephant as he lifts the immense logs with ease—the patient camel, able to travel over the trackless desert carrying the supplies to those who wait, because of his capacity to store water required for the long journey. Water is the natural drink. Man only has departed from the natural order and made a drink that hurts the body.

PURE WATER

If a chemist wishes to obtain absolutely pure water he distils it and the water which has been changed to steam and then back to water as it drops from the end of the tube of the still is absolutely pure.

Nature's distillery is a more wonderful arrangement. The sun, though millions of miles away, is fierce enough to warm the surface waters of the ocean so that an invisible steam rises into the hot air, free from every impurity. Whilst the surrounding air remains hot, these minute particles of water are invisible, but if a cool wind rises, the invisible drops are chilled and become visible. This we call a cloud. These clouds go sailing through the air, now high, now low, according to the warmth or coldness of the atmosphere. They strike against the mountain peak, and the moisture streams down every tree, leaf, and every blade of grass. The coldness of their surface has condensed the vapour into water once more. On meeting a cold wind the cloud is all turned into water, the small drops join each other until they are too heavy to be longer carried in the air, so they fall as

raindrops. Every river, though it flows from the hills, received every drop of its water from the seas, to which it hurries back.

Health is the most precious of all possessions. The body is a wonderful and very complicated machine which requires proper treatment in order that it may carry out its work. The principal things required for good health are: (1) Fresh air; (2) pure water; (3) proper wholesome food; (4) clean bodies; (5) proper exercise and rest; (6) clean surroundings; (7) temperate habits in all things and knowledge of what to do, and to avoid, and the good sense to use this knowledge.

The body is made up of two-thirds water and one-third solids. The following figures will give us some idea of this:

Bones contain about 22 per cent. water.

Blood contains about 79 per cent. water.

Skin contains about 72 per cent. water.

Brain contains about 75 per cent. water.

Lungs contain about 79 per cent. water.

Therefore, the body requires a great amount of water each day. We do not need to drink it all, as the food we eat is mostly made up of water, as our blackboard diagram shows:

Water is used up very quickly in the body, its chief duty being to help the body get rid of waste material.

Approximately three-quarters of a pound of water is breathed out of the lungs every twenty-four hours. Water, also, helps to get rid of the waste material through the pores of the skin in the form of perspiration. This last method is wonderfully interesting. There are about two and a half million waste pipes in the skin. These, placed end on end, would make a tube between ten and twenty miles long. In order to retain good health it is

essential that these little tubes be kept clear of anything that would clog the opening. Water, therefore, is essential—externally, to keep the skin clean, and internally, to assist in the elimination of waste material.

When the body requires more water, nature gives warning by causing a sensation of thirst. A person can live longer without food than without water. An instance is given where at a mine in the Rhondda Valley, Wales, four men and a boy were imprisoned for ten days; they had no food with them, but happened to have a plentiful supply of water. To everyone's astonishment, when the rescuing party reached the miners, they were still alive.

Water is the great thirst quencher, and when we take other drinks it is the water in the drink that quenches our thirst.

"Water also helps to regulate the heat of the body by circulating through the different tissues and by the act of perspiration. When we perspire some of the water of the body passes off as vapour, and as this goes on the body is cooled, because as the water is changed into vapour heat is used up. In the same way we can cool a room in very hot weather by sprinkling the floor with water; as it dries up or is changed into vapour the temperature is reduced. The more rapidly we perspire, the less we feel the heat."¹

LESSON APPLIED

Water is Nature's drink, and is the most valuable liquid known to man. Alcohol has a strange affinity for water and when it is taken into the human body it robs the tissues of their water. In this way alcohol causes a sensation of thirst instead of being a thirst-quencher as so many people imagine. We will learn in later lessons how alcohol is procured and how its use as a beverage

interferes with healthy growth. We get a hint of this in the following illustration:

Sir B. W. Richardson, M.D., observed that a solution of alcohol, 1 to 1,000, 2,000, or even 3,000, proved fatal to fresh water medusæ. The details of the experiments were as follows:

"Water from the tank of the botanical gardens, in which this little fresh-water jelly-fish lived, was collected in a jar and charged with one gramme of absolute alcohol to a thousand of water. A duplicate jar of plain tank water was placed side by side with the first, and in each a medusa was put. On entering the jar containing alcohol and water the medusa's swimming movements were seventy-four in the minute, but within two minutes these stopped, and the animal began to shrink and to sink to the bottom of the vessel.

"At the end of five minutes the little creature lay at the bottom apparently dead, and although it was put into plain water for twenty-four hours it did not recover. Meanwhile the medusa in the other jar was active and unaffected."²

ILLUSTRATION

Sir Benjamin W. Richardson, before he became an abstainer, once prescribed wine for a celebrated boat race trainer, who refused to take it, saying, "By drinking wine I should lose four points on which I rely in my business, viz., 'Endurance, Decision, Precision, and Presence of Mind.'"

Before the Australian cricket team left for England in 1921, humorous reference was made by some papers to the fact that nearly all of the sixteen men chosen to represent Australia in England were abstainers, but the records put up by that team are higher than those of any that have previously visited England, and show what

can be done by men who keep their bodies fit and their minds unclouded by poisonous drinks.

Dr. Johnson, one of Britain's most famous men, shows what he thought of alcoholic liquors: "Wine gives a man nothing, it gives him neither knowledge nor wit, and I now no more think of drinking wine than a horse does; the wine on the table is no more for me than for the dog under the table."

"There is no secret in the marathon game. You must think clean, live clean, obey the laws of nature, and of God." These are the words of John Miles, of Sydney Mines, Canada, who won such a notable victory in the Boston Marathon, 1926.

METABOLISM (SENIOR)

Metabolism is the healthy action of the human system. "Poisons in general being chemical substances, tend to exert a delaying or inhibitory influence over the chemical processes of the body, which processes must go on unhindered if the body is to carry on its functions usefully. These consist of:

1. Oxidation.
2. The storing up of nutriment.
3. The manufacture of secretion.
4. The production of energy and muscular movement.
5. The excretion of waste material.

all of which processes form the duties of the component cells of the tissues of our body. These chemical activities are spoken of in their entirety as metabolic; and the word "metabolism" is used to denote the normal healthy chemical changes going on in the body as a whole. . . . "Throughout the whole of nature, water plays a remarkable part in facilitating chemical changes: indeed, its presence is absolutely essential to many of these. . . .

Its function is to act as a 'middleman.' Its molecules are readily taken up by many a compound, which after this junction with water can then be split up into much less complex substances, which are more soluble and more easily excreted. Thus, that most vital part of our metabolism, namely, the getting rid of waste products, or the free flushing of the tissues with water, is not merely a popular expression, but has a definite basis in fact."³

Questions—

- (1) How does Nature provide pure water for us?
- (2) What percentage of water does the body contain?
- (3) What did a celebrated boat race trainer say regarding wine?
- (4) What are the functions of a healthy body?

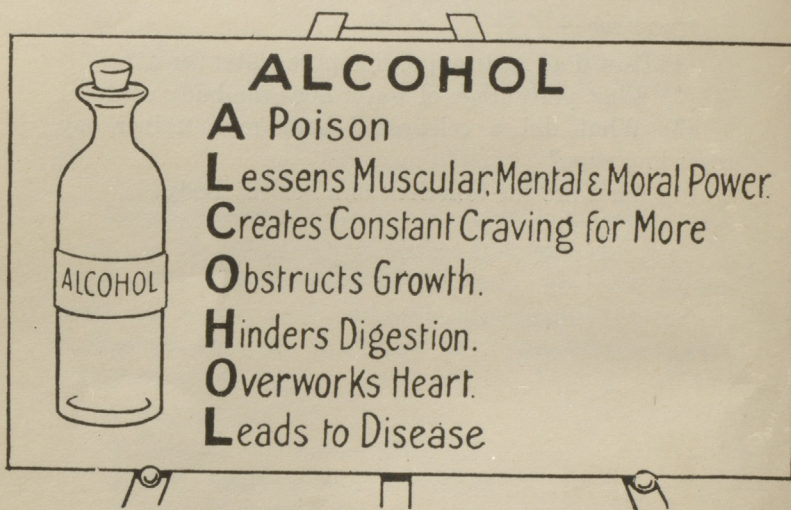
LESSON NO. 2

GRAPES TO WINE

TEACHERS' NOTES

CHART No. 2—"Grapes to Wine."

Blackboard—



*Object Lesson—*Bunch of Grapes.

Experiment—"Take two pieces of blotting paper and dip one in water, the other in alcohol. Place one on each wrist and cover with something to prevent evaporation, such as a watch glass, egg cup or large thimble. Leave for a few minutes and then note that the wrist covered by the one dipped in alcohol is redder than the other, this is due to the blood vessels being dilated."⁴

Memory Verse—

Inflaming wine, pernicious to mankind,
Unnerves the limbs, and dulls the noble mind.

—Homer.

Scientific Thought—"Alcohol is a waste-product in the activity of the yeast plant."—C. F. Hodge, Ph.D., Professor of Physiology, Clark University.

Aim—To teach that Alcohol is not found in the wholesome fruits of the earth as provided for our use.

THE LESSON

Alcohol is nowhere found in Nature except in decaying matter. The manufacture of wine is a good example of this fact. Grapes are wholesome and full of nourishing and beneficent qualities. In some Eastern lands they form a considerable part of the food used by the people, either fresh or dried. There is no alcohol in grapes, but there is in wine. We give the following table to show the difference:

Grapes contain approximately—			Port Wine contains approximately—		
Water.....	80.0	per cent.	Water.....	78.0	per cent.
Salts.....	0.4	"	Salts.....	0.2	"
Albumen...	0.7	"	Albumen...	0.3	"
Sugar.....	13.0	"	Sugar.....	3.5	"
Cellulose...	5.1	"	Alcohol....	17.5	"
Tartaric acid	0.8	"	Refuse.....	0.5	"
<hr/>			<hr/>		
100			100		

The amount of alcohol in ordinary wine varies from 5 to 22 per cent. (See table, Lesson No. 3.)

FERMENTS OR YEAST GERMS

Yeast is a very small, cell-like plant that lives on the outside of the skins of fruits, in very rich earth, and that often blows about in the air. The favorite food of this small plant is sugar; when it falls into a liquid that contains sugar it grows and multiplies very rapidly; in doing this it uses the sugar for food and breaks it up into water, carbon dioxide and alcohol. The process is called fermentation. The alcohol in all different kinds of intoxicating drinks that are used by man, comes from the fermentation of sugar by yeast.

If we look at a yeast plant through a microscope we will see that it looks like a colorless jelly-like cell, for though it is a plant it has neither leaves nor root. When yeast is growing under natural conditions the alcohol made will pass off into the air, and the yeast will not have to live in a solution of alcohol, but when it is growing in a sugary liquid the alcohol remains in the fermenting liquor; the effect of this is very quickly seen on the yeast cell, and here we get our first hint of the influence of alcohol on life. When there is only one-tenth part of alcohol in one hundred present, the growth of the cells is hindered, and when thirteen per cent. of alcohol is present the yeast cell can carry on no further, it is put out of action by the very poison that it has made. Thus we see that alcohol begins its journey by destroying that which gave it birth.

If we look at a grape through a microscope, you may see these little yeast germs, or ferments, on the outside of the skin, but because the grape has a waterproof, air-tight skin, the germs are kept on the outside, and so are unable to reach the nectar so marvellously stored within. We may learn from this that nature adopts methods that preclude the possibility of alcohol being formed in fresh,

wholesome fruit. Thus when we take a grape and break Nature's little bottle between our lips, we get grape juice one hundred per cent. pure. Grape juice is regarded by many as the third most valuable liquid known to mankind. Water first, milk second, and grape juice third.

The wine maker takes the luscious grapes, breaks the skins, and exposes the juice to the air. The little yeast cells are in the nectar in a flash, and at last are able to feed on the grape sugar. As they eat and multiply they are changing the grape sugar to alcohol and carbon dioxide gas. This is called a chemical change.

THE LESSON APPLIED

Thus, in the fermentation of grape-juice we lose much valuable grape sugar, and in its place get alcohol, a poison that is harmful to the human body, and which has a power to create a craving for itself, as do some other poisons. As it also weakens the will power, judgment and moral sense, alcohol is responsible for making thousands of people drunkards. Once a person is in its power, it acts like a magnet to draw him on to his own destruction.

An Eastern fable tells of a magnetic mountain which could attract ships, and draw out the iron bars and bolts, leaving the vessel a mass of broken beams and spars.

Intoxicating drink is like that—it attracts men and then destroys their best qualities, leaving only a wreck of body and mind.

In "Gulliver's Travels" we get the following:

"Wine was not imported among us from foreign countries to supply the want of water, or other drinks, but because it was a sort of liquid which made us merry by putting us out of our senses, diverted all melancholy thoughts, begat wild, extravagant imaginations in the

brain, raised our hopes and banished our fears, suspended every office of reason for a time, and deprived us of the use of our limbs, till we fell into a profound sleep, although it must be confessed that we always awakened sick and dispirited, and that the use of the liquor filled us with diseases which made our lives uncomfortable and short."

Diogenes, being presented with a large goblet of wine, threw it upon the ground; when blamed for wasting so much good liquor, he answered: "Had I drunk it there would have been double waste, I, as well as the wine, would have been lost."

CHEMICAL CHANGES (SENIOR)

A chemical change takes place in the grape juice when fermentation begins. There are two great classes of natural changes always going on around us. They are called Physical and Chemical changes. The difference between the two is of extreme importance. In Physical changes there is an alteration of the properties of a substance, but no alteration in the constituents of a substance. A pound of water, a pound of ice, and a pound of steam are very different things as far as their properties go, but they are identical in their constituents.

In chemical changes there is an absolute change of constituents, and we may obtain from one set of materials something that is entirely different in character, and which may have exactly the opposite qualities the original material possessed.

If we dissolve salt in water we may think we have a chemical change, but all that has happened is that the salt has been dissolved and cannot be seen. If we boil the salt and water, the water will escape as steam, and we may recover the exact amount of salt that was used—that is a physical change. But if we take a few sheets of

Dutch metal (which is copper beaten out very thin), put it in a vessel, add some nitric acid, the metal at once dissolves, as did the salt. The solution assumes a green color, and we may imagine from our previous experiment that the copper is still there, only in solution, but something very different has happened; there has been a chemical union, formed between the metal and acid, and if we evaporate the liquid, as in the salt, we will find that we have a piece of material which looks like green glass. That is a chemical change; the copper has entirely gone.

This is the nature of the change that takes place during fermentation. The sugar in the grapes, etc., has been turned into something very different from what it was, and no known process can convert the alcohol back to sugar. A chemical change has taken place. It does not follow that because grapes are good and wholesome, wine must be; in wine we have the presence of a poisonous drug that does not exist in the grape.

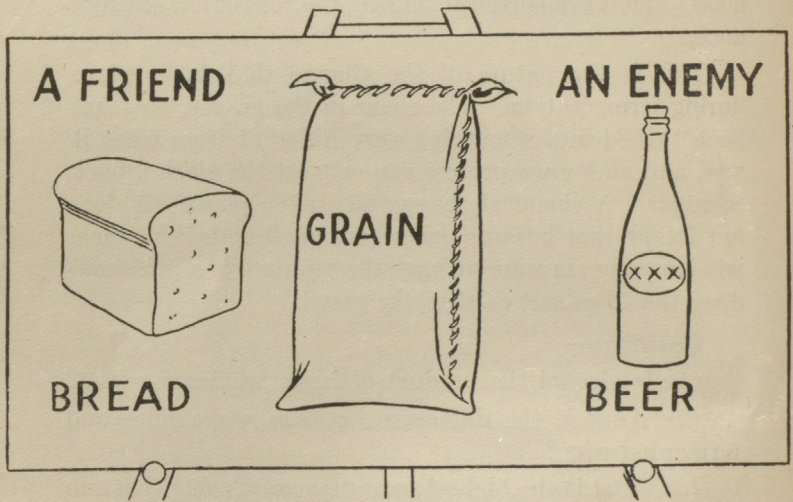
Questions—

- (1) Is alcohol the product of fresh, wholesome food?
- (2) What is the difference between grape juice and fermented wine?
- (3) What is the highest percentage of alcohol that can be obtained by fermentation?
- (4) Why?
- (5) What is the difference between a physical and chemical change?

LESSON NO. 3
BARLEY TO BEER
TEACHERS' NOTES

CHART No. 3—"Barley to Beer."

Blackboard—



Object Lesson—Some grains of barley that have been placed on moistened cotton-wool, and so are commencing to sprout.

Experiment—Into a wide-mouthed glass bottle (a two-pound jam jar does very well), place two tablespoonsful of brown sugar and about one-third fill with lukewarm water, stir well and then add a few small pieces of dried yeast, stir again, and cover jar with a piece of cardboard.

If we observe the jar an hour after it has been prepared, we shall see that the liquid is slightly agitated—it is fermenting.

Memory Verse—

'Mid rot of barley, rot of corn,
That's where alcohol is born.

Scientific Thought—“Alcohol helps time to produce the effects of age, and, in a word, is the genius of degeneration.”—W. H. Dickinson, M.D., Med. Chir. Trans.

*Aim—*To teach how cereals, valuable for food, can be changed into something harmful to mankind.

THE LESSON

In our last lesson we studied the manufacture of wine, and learned how grapes are treated in order to obtain alcohol. To-day we are to study how barley, which is a good wholesome food, is changed by the brewer into an alcoholic drink.

It seems strange that barley and other cereals can be used to obtain alcohol. We know that to obtain fermentation it is necessary to have liquid sugar, in order to understand the process we must learn how the starch that is in barley can be turned into sugar.

In our chart we see a grain of barley. You can see the latent plant or embryo, and the store of starch. When the seed is placed in the ground, a warm, moist atmosphere will cause it to germinate; the plant is very small, yet it must have food. Now there is also present in the seed an agent called diastase, which acts on the starch, and very slowly turns it to sugar; this the plant lives on until it is able to obtain its own supplies from the air by means of its leaves, and from the ground by means of its roots.

MALTING

This sugar is what the brewer requires to obtain beer. The actual process is varied in the manufacture of different kinds of beers, but the main principles that govern the chemical change, which produces alcohol, are much the same. The barley grains are placed in a tank containing water and left there for about forty-eight hours; they are then piled in a heap and afterwards spread over the "germinating" floor. In a few days the little sprouts appear, but they must not be allowed to grow, or they would use up all the sugar, so the grain is dried, in a kiln, and the sprouts rubbed off. The objective of the brewer has been reached, the diastase has commenced the work of converting the starch into sugar to feed the tiny plant, and thus is formed the sugar that the brewer requires. This process reduces the food value of the grain by twenty per cent. The next step is the

MASHING

Very hot water is added to the grain for completing the conversion of the starch to sugar, which dissolves in the liquid. The grain is strained off and sold for cattle feed; the remaining liquid is called sweet wort. The food value of the barley has again been reduced by fifty per cent.

The sweet wort is boiled with hops and cooled ready for

FERMENTATION

It is during this process that the chemical change takes place, and alcohol is formed. Fermentation is caused by adding yeast to the liquid; these little ferments act on the sugar in the liquid in the same way as they did in the grape-juice, and succeed in converting a percentage of it into alcohol. The ferments multiply very fast in the

sweet liquid, but as the amount of alcohol increases they become less active. The fermentation process has again reduced the food value about twenty-seven per cent., leaving less than three per cent. in the beer. (See chart.)

Some people imagine that beer is liquid bread, but Dr. Saleeby, the noted British scientist, says: "Beer is a devitalized, devitaminized, drugged, decayed, impoverished 'food,' and 'it is nothing under the sun but poisoned water.'"

BEER AS A BEVERAGE

Many people believe that because beer is not so highly alcoholic as wine and spirits that it is a safe beverage to drink; but it is wise to remember that a person will often drink a greater quantity of beer than he would of spirits. In a pint of beer there is about as much alcohol as there is in a whiskey and soda. It is the amount of alcohol consumed that counts, and the same results will follow alcohol poisoning, whether the alcohol is taken in the form of beer, cider, home-made wines, ordinary wines or spirits. All the alcohol taken finds its way into the blood stream, still as alcohol; the only difference is in the rate of absorption, which is somewhat slower in the case of the more diluted forms of alcoholic drink.

"The following table shows the amount of alcohol contained in certain well-known alcoholic beverages:

	Percentage of alcohol
Beer.....	4 to 5 per cent. by weight
Cider, perry and other home-made wines.....	5 to 10 per cent. by weight
Hock, claret.....	8 to 11 per cent. by weight
Port.....	16 to 18 per cent. by weight
Marsala.....	14 to 24 per cent. by weight
Orange wine, raspberry wine.....	8 to 11 per cent. by weight
Champagne.....	8 to 11 per cent. by weight
Sherry, madeira.....	13 to 18 per cent. by weight
Medicated wines.....	15 to 23 per cent. by weight

Gin.....	about 31 per cent. by weight
Rum.....	40 to 50 per cent. by weight
Whiskey.....	44 to 50 per cent. by weight
Brandy.....	48 to 56 per cent. by weight
Absinthe.....	57 to 72 per cent. by weight
Rectified Spirit.....	84 per cent. by weight

"A pint of wine contains about six tablespoonsful of alcohol, whilst a pint of brandy consists of about equal parts of alcohol and water . . . every pint of beer contains two tablespoonsful of alcohol, i.e., about as much as is in a glass of whiskey and water. Therefore it is as injurious as the stronger drinks, except that, owing to the greater dilution it is somewhat less distinctly irritating to the mucous membrane of the stomach."⁵

THE LESSON APPLIED

When men drink alcoholic liquors they do so for the effect of the alcohol. Many have learned to like its drug action which we will consider in a later lesson. Therefore, it is unwise to begin the habit of using such drinks, as the tendency is to want stronger drinks and oftener. Alcohol is the enemy of life, whether taken in beer, wine or spirits. Beer does not give strength as many people imagine; the following illustration helps to show how this has been proved.

ILLUSTRATION

Experiments by Dr. Parkes.

"A series of observations made by the late Dr. Parkes (Netley), and reported by the late Sir Andrew Clark, bear upon this matter. A number of soldiers of the same age and same type of constitution, living under the same circumstances, and eating the same food, were collected together and then divided into two gangs, an alcoholic gang and a non-alcoholic gang. Certain work was given them to do, for which they were paid extra

by Dr. Parkes, according to the amount of work they accomplished. The men in the gang which was allowed alcohol and beer, had beer at their disposal, and when they felt tired they resorted to its use. For the first hour or two the alcoholic gang went ahead, but after a time their energy began to flag, and before the end of the day, their rivals, the non-alcoholic gang, had accomplished far more work, and received more pay. When this had gone on for some days, the men who were having beer begged that they might be transferred to the non-alcoholic gang in order that they might earn more money. Dr. Parkes declined to allow this. But, in order to make the experiment conclusive, he transposed the gangs, the men being willing to lend themselves to the experiment. Those who had so far had beer were now allowed none at all—the others, who had so far been abstainers, being given the beer. The results were exactly the same. The alcoholic gang went ahead at the starting, but failed utterly towards the end of the day—the non-alcoholic gang now accomplishing far more work than the other.”⁶

CARBON DIOXIDE (SENIOR)

The history of carbon dioxide, the story of how it came to be in our atmosphere, is one of the most interesting chapters of science. In a pint of aerated water are millions of molecules that dance about at inconceivable speed. Each bubble is made up of bunches of these molecules of carbon dioxide gas, made up of one atom of carbon and two of oxygen. This gas is the staff of life for the whole plant kingdom, to it the world owes all its plant life and all the energy of the animal creation. We may eat white flour and not black coal, but the carbon of the wheat when brought in contact with the

oxygen of the blood, burns in us and gives forth heat as coal burns in a furnace blast and heats a boiler.

A green leaf is a most exquisitely constructed apparatus. If we study the leaf of a plant through a microscope, we find on its under surface hundreds of thousands of little mouths. Through these tiny mouths the air with its carbon dioxide passes into the air spaces between the little cells, which compose the body of the leaf; but as soon as sunlight reaches the leaf an amazing thing happens; the carbon dioxide breaks up into carbon and oxygen and the oxygen is set free, while the carbon is retained. This sounds quite simple, but it is not as simple as it sounds: it is one of the most mysterious and momentous occurrences in nature. The sunlight and the green plant working together, quietly and gently tear the oxygen and carbon apart. The chlorophyll, the colouring matter of the green leaf, has something to do with the breaking up of carbon dioxide and the formation of starch. We also know that light is essential to the process and that the red rays are the most active agent. Thus we have provided for our use oxygen to breathe and sugar and starch to eat from the carbon.

It is significant that alcohol interferes with this wonderful process in nature. Dr. Ridge found that alcohol hinders the formation of the green colouring matter in plants. He experimented with geraniums and found that one part of alcohol in one hundred of water affected the growth and the production of green colouring matter.

The carbon in the wheat or other grain which, as food, supplies heat and energy for the body is changed by the process of fermentation, the food value being almost entirely destroyed. The change is a chemical one, as we learned last lesson, providing us with a sub-

stance called alcohol, which in its turn, if added to the water supplied to plants, will hinder the growth of chlorophyll, and when taken into the human body hinders the cells in their work of keeping the body in health. Thus we begin to understand how truly alcohol is the enemy of life.

Questions—

- (1) What is the process the grain must pass through in order to produce beer?
- (2) How is the food value reduced?
- (3) Is beer intoxicating?
- (4) How does the green leaf help to provide carbon for food.

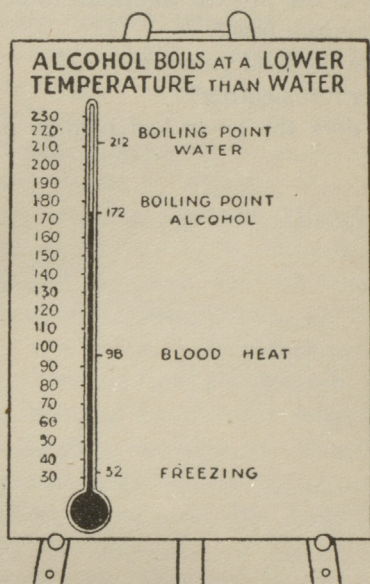
LESSON NO. 4

ALCOHOL

TEACHERS' NOTES

CHART No. 4—"Alcohol."

Blackboard.



Object Lesson—Bottle of Alcohol.

Experiment—If we pour some water and alcohol into a large test tube and then shake them together, three things will be noticed: (1) On shaking the tube so that the two liquids mix, we shall observe a large number of tiny bubbles being driven off. Ordinary water contains air dissolved in it, and when the alcohol mixes intimately

with the water the air is driven out in these bubbles. (2) Heat will be developed as a result of this joining together of the two liquids, and the tube will become perceptibly warmer than another tube containing water only. (3) Equal volumes of the two liquids, when mixed, will be found to occupy less space than that of the two separate volumes.

Memory Verse—

The kettle sang a cheery song
And tuned it with the lid—
Men say that liquor makes them strong;
It never, never did.

Scientific Thought—“Alcohol is a poison.” Sir Andrew Clark, M.D.

*Aim—*To teach that alcohol, as a beverage, is a curse, but used for commercial purposes is a blessing to mankind.

THE LESSON

In Lessons No. 1 and 2 we studied the chemical change which takes place during fermentation, which produces alcohol.

DISTILLING

When a higher percentage of alcohol is desired, the art of distilling is resorted to. There are several methods used, but the principle in each is the same. The fermented liquid is heated, so that the alcohol, which boils at a lower temperature, is driven off in the form of vapour, most of the water being left behind; this vapour is condensed again to a liquid condition by means of passing through a long coil, which is cooled by a water jacket. At first the distillate always contains some water in addition to the alcohol, but if desired it is quite

easy to repeat the process several times, and in this way to obtain pure alcohol, practically free from water. When pot stills are used the flavour of the elements present in the fermenting liquid is retained, but the "Coffey" still produces pure Ethyl Alcohol and water. As this form of distilling is much cheaper, spirit manufacturers are making a practice of using this product—ethyl alcohol and water—and adding to it the flavours they desire to make—brandy, whiskey, rum, or gin.

INTOXICATING DRINK

There are three classes of alcoholic drinks, known as:

Beer, which includes porter and stout.

Wine, which includes sherry, claret, champagne, and many others.

Spirits, which includes whiskey and brandy, rum and gin.

All drinks that contain alcohol are spoken of as "intoxicating." This designation was given to them long before the correctness of the term was proved. The word "intoxicating" is derived from the Greek word "toxikon," which means poison. Scientific research for many years has proved beyond doubt that alcohol is a poison in its action on the human body.

THE USES OF ALCOHOL

There are many ways in which alcohol can be used. It is useful to naturalists for preserving specimens, to chemists for dissolving certain substances and preventing the dissolving of others; it is useful in the laboratory for burning in spirit lamps because it burns with a smokeless flame. Alcohol is used for thermometers in cold regions because it will not freeze readily. It is useful in many trades and for a variety of other pur-

poses. Methylated Spirits is used in enormous quantities and contains a large amount of alcohol. As power, alcohol is very useful and in the future we will probably see it become one of the principal driving powers of the world. It is good for the engine of the motor car, but not for the engineer.

We thus find that alcohol outside the human body can be a very great friend, but when taken as a beverage it is a deadly enemy. An old professor has summed up the position thus—"If you want to preserve a dead body you put it in alcohol; if you want to kill a living body you put alcohol into it."

The chemists of the middle ages who discovered distillation, called brandy *aqua vitæ*, or water of life, but judging from the evils caused by alcoholic liquors, we would be justified in speaking of it when used as a beverage as *Aqua Mortis* (the water of death).

Some people argue that because alcohol can be obtained by fermentation it is a product of Nature, and therefore good for human consumption. Nature provides many things for many purposes. Typhoid germs are a product of nature; so are snakes, but no one feels that they must be on friendly terms with these things on that account. When we are searching for mushrooms we are always very careful to avoid the toadstool, yet both the mushroom and the toadstool are the products of Nature. With alcohol we must remember that it is never found in wholesome foods, but always as a result of decay and decomposition.

THE LESSON APPLIED

A study of the very things for which alcohol is useful will help us to understand why it must be injurious to the human body, with its delicate mechanism, when taken

as a beverage. Such as its use for preserving specimens, that it is inflammable and that it is used for making explosives. (It takes a ton and a half of alcohol to make a ton of smokeless powder.)

ILLUSTRATION

King Cyrus, who overthrew Media and Babylonia, and who established the great Persian Monarchy, when a boy visited his grandfather, King Astyages of Media; he was astonished and disgusted at the riotous drunkenness of the Median court, and refused to touch the wine, a custom expected of him as the cup-bearer to his grandfather. The king asked him why he would not drink. "Sire," replied Cyrus, "I was afraid to taste because I thought there was poison in the liquor, for not long since at an entertainment I saw the lords of your court, after drinking it, become noisy, quarrelsome and frantic; even you, sire, seemed to forget that you were king."

WHAT IS ALCOHOL? (SENIOR)

Ordinary alcohol—chemically known as ethyl alcohol, C_2H_5OH —is one of a group of "Alcohols" which include wood spirit, glycerol and cerotin.

It derives its name from the Arabic Al-Koh'L. Spirituous liquors have been known and used from time immemorial, but alcohol distilled from wine seems to have been first obtained by Arabian chemists. Towards the end of the thirteenth century it was known in Europe under the style of "aqua vini" and later "aqua vitæ" and is alluded to by Shakespeare in "Othello" (Act ii, Scene 3):

"O thou invisible spirit of wine, if thou hast no name to be known by, let us call thee devil."

"Alcohol is a 'mobile, colourless liquid, possessing a slight but agreeable spirituous odour and a pungent taste, and burning with a pale blue, non-luminous flame'" (Simmonds, p. 143). Its boiling point is lower than water, being about 78° Centigrade, or 172° Fahrenheit. Its freezing point is very low.

Alcohol is especially useful as a solvent of organic and inorganic substances. It dissolves balsams, essential oils, fatty acids, hydrocarbons, resins, soaps, sugars and many drugs like camphor, phenacetin and others.

It is difficult to obtain pure alcohol—that is, alcohol without any water, owing to its affinity for water.

"Rectified Spirit"—the alcohol of the British Pharmacopeia—is a mixture containing ninety parts of ethyl alcohol in one hundred parts by volume.

"Proof spirit" means a mixture of alcohol and water fixed by statute as consisting of 49.28 per cent. of alcohol by weight, or 57.10 per cent. of alcohol by volume. The word "proof" is used to indicate that the spirit has been tested for its alcohol. In the old days, when there was no testing instrument, gunpowder was soaked with the spirit, if when it was lit the powder flashed, the spirit was "over proof," if not, it was "under proof." The gradations of the strength of alcohol can now be accurately measured. If a spirituous liquor has a higher percentage of alcohol in it than 57.10—the standard—it is said to be over proof (O.P.), if a lower percentage of alcohol than 57.10, it is said to be under proof (U.P.).—*British Excise System*.

It may be noted that to "reduce"—i.e., dilute—spirits allowance must be made for the curious fact that one hundred gallons of alcohol added to one hundred gallons of water, do not make two hundred gallons of mixture, but

an appreciably smaller quantity, owing to contraction. Alcohol is like Pharaoh's lean kine, it absorbs without increasing its own bulk. It is this property which leads to the use of alcohol as a preservative of specimens, in medical and other museums, and this attraction that alcohol has for water makes it a thirst producer, not a thirst quencher.

Questions—

- (1) What process is necessary to obtain a higher percentage of alcohol from fermented liquors than thirteen per cent.?
- (2) What is the meaning of "intoxicating" drink?
- (3) What are some of the uses of alcohol?
- (4) What is meant by "over proof"?

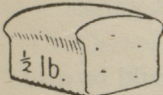
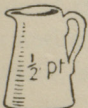
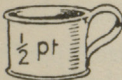
LESSON NO. 5

THE NEEDS OF THE BODY

TEACHERS' NOTES

CHART NO. 5—"The Needs of the Body."

Blackboard.

	$\frac{1}{2}$ lb bread contains 286 grains body building material
LOAF	
	$\frac{1}{2}$ pint milk .. 176 " " " "
MILK	
	$\frac{1}{2}$ pint beer .. 20 " " " "
BEER	

Object Lesson—A loaf of bread.

Experiment—Arrange some small jars, in which place loaf sugar, meat, bread, white of raw egg, etc., fill each with alcohol and make air-tight. Also set meat and bread in water. (Every teacher can, with a minimum of trouble, fix up a number of these jars. They are useful as an object lesson on many occasions, and have the advantage of being ready for service at any time.)

Memory Verse—

“Water is good, outside or in,
To slake the thirst, or cleanse the skin.”

Scientific Thought—“It is only lately that we have begun to regard alcohol in its true light—as a drug and not as a food.”—Sir Spencer Wills, Bart., M.P., F.R.S.

Aim—To teach how nature provides for the needs of the body, and how alcohol not only fails to take its place as a food, but that it interferes with nature's provision.

THE LESSON

An average human body (male adult) would be made up approximately as follows:

12 gallons of water (over 60%).
12 lbs. mineral matter.
12 lbs. fat.
24 lbs. proteid.

Lighter or heavier human bodies contain approximately the same proportions.

Proteid is like the white of an egg and forms part of every cell in the body.

When we run, speak or think, or whatever we do, we exert force, lose heat, use up the various parts composing our bodies, and get hungry. It is to satisfy this hunger, to make up this waste, to supply fresh heat and to give renewed force, that we take food.

FOOD

1. There are four elements in food required by the body: Nitrogenous substances, which are flesh forming. Their principal work is to build up muscles, nerves and brain. Nitrogen is largely contained in whites of eggs

and lean meat (Albumen), cheese, skim milk (Casein), bread, and all kinds of grain foods (Gluten); peas and beans (Legumin). These are all albuminoids or flesh formers.

2. Mineral matters, or salts, which are bone-forming substances. They are chiefly obtained from milk, fresh vegetables, fruit and outer portions of grain, such as wheat, barley and oats, and in lesser proportions from animal foods. These mineral foods, in addition to building up bone, teeth, etc., are useful for keeping the blood in a healthy state.

3. Carbonaceous substances, which are heat giving. They are like the coals in a steam engine, for they provide the heat and energy, and form the necessary fatty foods of the body. Carbon is largely contained in fats, oils and sugar, also in starch, which is found in all kinds of grain, in potatoes and some other vegetables.

4. Water. This softens the solid food and helps to digest it. By its presence in the blood it carries the digested food to all parts of the system, and bears away that which is not needed, at the same time equalizing the heat of the body (see lesson No. 1).

Bread made from wheat-flour is almost a perfect food. It contains eight per cent. of flesh forming, two and one-half per cent. bone making, and fifty-two and one-half per cent. heat giving substances, together with thirty-seven per cent. of water; that is to say, everything mentioned in the four classes given above.

Milk contains four per cent. of flesh forming matter, one per cent. bone forming, and nine per cent. of heat-giving substances, with eighty-six per cent. of water. Bread and milk, therefore, may be instanced as typical foods.

DIGESTION

In our lesson to-day we will learn something of the machinery provided in this wonderful body of ours, which takes the food and, by a chemical process, changes it into body-building material, also whether alcohol helps this process or hinders it.

There are two distinct functions continually taking place in the human body; one is to take the food, air and water that is provided, and build up the cells, etc.; the other is to destroy the waste and worn-out material. Water is the first essential in working out these changes. Digestion is the rendering of food into a liquid condition. This process begins in the mouth, and that organ may be compared to a mill, grinding and mixing substances; at the same time, with the help of the tongue, the food is turned over and over and not only comes in contact with the teeth, but is mixed with the saliva, which is the first of the four juices that act on the food. Saliva acts on substances such as rice, bread, potatoes, oatmeal, arrow-root, etc. (which contain starch) in the same way as boiling water does, to make it soluble. The food then passes to the stomach and is afterwards brought in contact with the other juices which reduce the food to a liquid condition so that it may be absorbed by the blood.

An old proverb says, "The blood is life," and the saying is perfectly true. Where the blood is good and pure there is sure to be healthy and vigorous life. One of the great sources by which the blood is nourished and enriched is the food we eat. All food to be of any service to the body must find its way into the blood circulation, for it is by the blood stream that the food is carried to bone and muscle, to brain and nerves, and all other tissues. In this way strength is built up and health maintained.

CONSTRUCTION AND DESTRUCTION

When we see workmen erecting a building, we say it is under construction, but if someone comes along and burns it down, that is destruction. We have learnt something of the construction of the body, and the precious asset a strong, healthy constitution is.

To keep the body strong we have to provide it with food and water, and just according to the value of the food taken and digested, so will strength be built up.

Among the most important of foodstuffs is grain, or cereals. Those who have been in the country have perhaps seen the grain growing, first the tiny blade, then the ear, and the ripe grain ready for

HARVESTING

It is interesting to watch the farmers gather in the golden harvest. One machine that they use, called the reaper and binder, is wonderful; it first cuts the stalks close to the ground, quickly gathers an armful, which it ties into a bundle ready for threshing. Another machine, called a Header, only takes off the tops, which it separates from the chaff. As we watch these operations and see grain being gathered ready to send away by ship and train to be milled, ready for our use, we are glad, because we know that there will be plenty of food, and that the grain will be used for construction of health and strength. But when we think of other uses to which this grain is put there comes a feeling of regret that much of that good, wholesome grain will be used to produce a poisonous drink which will not build up health and strength, but destroy them.

GRAIN USED FOR CONSTRUCTIVE PURPOSES

When the grain is sent to the miller, he prepares it for the baker, and bags of flour are the result. These, in

the hands of the baker, are soon made into bread, and the crisp, fresh loaves are brought to our homes, where they become part of our daily food and help to build strong, healthy bodies. Thus, the grain, used for constructive purposes, leads up to health, strength and happiness.

GRAIN USED FOR DESTRUCTIVE PURPOSES

When the grain is used to produce intoxicating liquor (*vide* Lesson No. 3), we find, if we follow its influence, that the steps lead down, and are as follows: Intoxicating liquor, waste, weakness, decay, sorrow.

It is foolish to suppose that because beer is not so highly alcoholic as wine or spirits, it is not harmful; we find that there is just as much drunkenness in beer-drinking countries as where drinks containing higher percentages of alcohol are more commonly used.

IS ALCOHOL A FOOD?

First, the question is, "Can alcohol be called a food?"

Earlier in the lesson we considered what constituted a food, and found that there were four elements required. When we ask does alcohol provide any of these, we find that (1) It contains no nitrogen, so cannot build up muscles, nerves, etc., (2) It has no mineral salts, so cannot form bones, etc., (3) Alcohol contains no water, so cannot supply the body in that respect, (4) A very little of the alcohol is converted into heat in the body, and on this account some scientists claim that it is a food.

"A food may be defined as any substance which, when absorbed into the blood, will nourish, repair waste, and furnish force and heat to the body without causing injury to any of its parts, or loss of functional activity. Alcohol fails to fulfil these conditions. Even if the heat, which

results from the combustion of alcohol, were not thus more than neutralized, it would still be both foolish and extravagant to use as a fuel or source of heat, anything which so markedly interferes with the well-being of the protoplasm of the body as a whole.

"As the *Lancet*, the leading British medical journal, points out with scientific eloquence, sea water may be used in the boiler of a steam engine, and the steam from its evaporation will transmit the energy of the fuel to the revolving wheels, but its corrosive action on the steel forbids its use except in emergencies."⁵

DOES ALCOHOL HELP DIGESTION?

We will find that it is possible to experiment along these lines ourselves, and so discover the effect of alcohol on food stuffs. By placing fish, meat, bread, loaf sugar, etc., in alcohol, we discover that they will not dissolve, and that alcohol hardens the food and prevents it from being reduced into a liquid condition. If we take two pieces of loaf sugar and place one in a glass containing water and one in a glass containing alcohol, we will find that the water carries out its work by dissolving the sugar, but in the other glass the sugar will remain a hard lump as it was at the beginning. The very fact that alcohol is valuable for preserving specimens shows us that its effect on the food in the human body, even in a diluted form, is to hinder digestion.

When alcohol is taken into the body, the coating of the delicate membranes is hardened, cells die and are shed, and the whole covering altered. Alcohol deadens the finer sensibilities. A drinker has rarely delicate taste regarding nice food—salt can be added to the intoxicated man's drink and he will not be conscious of it—his sense of taste has been deadened.

When a man buys beer he gets a small fraction of food, some poison, and the rest water. The same amount of money spent on bread will give him about sixty per cent. food, forty per cent. water, and no poison. Bread increases a man's muscles and sharpens his senses; beer changes the muscle to fat and poisons his brain.

Sir B. W. Richardson, F.R.S., showed, by experiment, that alcohol injures the muscles, and proved that the muscle, under the influence of alcohol, is not able to lift a given weight so high, or to hold it up so long as the muscle free from alcohol.

Prof. W. N. Osborne, M.B., Ch.B., D.Sc., Prof. of Physiology, University of Melbourne, says: "Experiments have been carried out, and repeated again and again, and it has been found that alcohol, far from being a stimulant for muscle, is a poison for muscle."

THE LESSON APPLIED

Alcohol is a poison which, when taken as a beverage, not only fails to meet the needs of the body, but, as a poison, exerts an inhibitory influence over the chemical processes of the body, which processes must go on unhindered if the body is to carry on its functions usefully.

ILLUSTRATION

The story of the capture of Troy by the Greeks, after a ten years' siege, as told by the poets, is, that the Greeks made a large wooden horse, secretly filled it with armed men, and appeared as though they were retreating from before the city. The Trojans thought they would like the wooden horse, so they brought it into their city. In the night the warriors crept out of their hiding-place and opened the gates to the Greeks, who were waiting.

Thus the city was captured, and those who escaped the sword were made captives.

So alcohol, disguised in its various dresses, as wine (bright ruby), champagne (golden), beer (amber), etc., resemble the wooden horse which was harmless when kept outside the walls, but when admitted with the soldiers concealed inside, was able to work great mischief to the city—so alcohol works destruction and ruin when taken into the human body.

A NATIONAL CRISIS (SENIOR)

Statistics show that from August 4th, 1914, to December 31st, 1917, during the Great War, Great Britain was in a serious position; there was not enough food for everyone to have plenty; people were rationed and there was a serious shortage of bread. During that time over five million tons of food were destroyed in the manufacture of intoxicating drink. In Lesson No. 2, we learnt how the grain is destroyed in the production of beer, and this is what happened to that enormous amount of good, life-sustaining food, which would have provided nearly three million tons of flour, and would have made over two billion loaves, or enough to supply the whole nation with bread for ten months. Sugar, which was also very, very scarce, was used for brewing; three hundred and ninety thousand tons were destroyed in the production of fermented liquors. If these cereals and sugar had been used for constructive purposes, and not for intoxicating drink, it would have made a big difference to the people of Britain. They would have been stronger and happier and better able to meet the demands of those strenuous times; there would have been less hardship, and food would probably have been cheaper.

ALCOHOL AND FITNESS

While the War was in progress, Sir Thomas Anderson Stuart, Dean of the Faculty of Medicine at the Sydney University, said: "Speaking entirely personally, I might be permitted to counsel earnestly all who value individual and national efficiency, to avoid the use of alcohol in any form, even in the smallest quantities, except on the written prescription of their medical attendant, for, as events of the day, in connection with the Great War, prove, it is the most soul destroying, body destroying, nation destroying substance ever known."

Great Britain's drink bill before the War had reached the huge sum of £160,000,000, or \$800,000,000, (in 1925 it had increased to over £300,000,000, over \$1,500,000,000), and we find that, according to the figures presented to the House of Commons, out of nearly two and a half millions of men examined, considerably less than a million (actually 871,769) were able to pass the standard for Grade 1 as having a full normal standard of health.

During the South African War the same thing happened, and a committee was appointed to enquire into the matter. Many causes of unfitness were found, but the evidence submitted teemed with testimony as to the disastrous effects of intoxicating drink.

In connection with the South African War campaign, Sir Frederick Treaves, speaking of the march to Ladysmith, said: "I was, as you know, with the relief column that moved on Ladysmith, and, of course, it was an extremely trying time by reason of the hot weather; in that enormous column of thirty thousand men, the first who dropped out were not the tall men or the short men, the big men, or the little men; they were the drinkers, and they dropped out as clearly as if they had been labelled with a big letter on their backs."

Questions:

- (1) What elements in food are required by the body?
- (2) Is alcohol a food?
- (3) Does alcohol help digestion?
- (4) What is the difference between grain made into bread and grain made into beer?
- (5) What did Sir Frederick Treaves say about the march to Ladysmith?

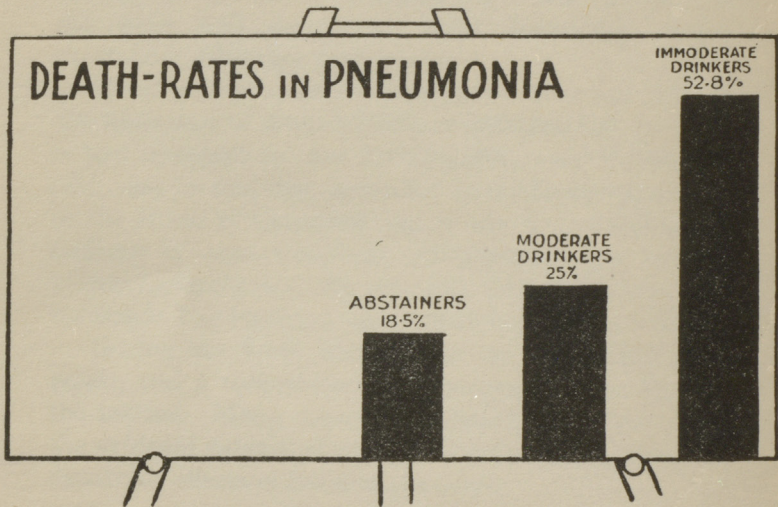
LESSON NO. 6

THE DEFENDERS

TEACHERS' NOTES

CHART NO. 6—"The Defenders."

Blackboard—



Object Lesson—Have an exhibition of physical culture, showing deep-breathing exercises.

Experiment—Put a tumbler over a small piece of lighted candle. The light is quickly extinguished owing to the fact that it rapidly burns up the oxygen in the small quantity of air in the tumbler. Where a candle cannot burn a man cannot live. In that respect we are like the burning candle. We must have a plentiful supply of oxygen, if we are to live at our best.

Memory Verse—

Result of total abstinence:

“Head clearer, body stronger,
Purse heavier, life longer.”

Scientific Thought—“Alcohol makes the bed for consumption.”—Sir A. Newsholm.

Aim—To teach the value of nature's defence against disease and the part that alcohol plays in breaking down those defences.

THE MICROSCOPE

Over two hundred years ago, a Dutch gentleman named Antony Van Leeuwenhoek was busy grinding lenses; these lenses he afterwards put together, and behold a door into a new and wonderful world; through this door he saw what no man had ever seen before, the blood corpuscles, the cell life in dirty water, the germs that cause disease; his microscope had opened to him the wonderful picture of the cell kingdom at work. With the help of the microscope, we can watch the yeast cells increasing in sugary liquid, and we can see the red and white cells floating about in the blood. With the help of the microscope, the body can be magnified until, if we could see the whole of it at once, it would appear to be over two miles long.

CELL LIFE

The bodies of all plants and animals are built up of millions of cells. The simplest form of life is the amoeba, consisting of one single cell. The amoeba lives in stagnant water and the microscope revealed that this very simple form of cell life has power to move, and absorb tiny particles of food, it also is able to get rid of waste material by excretion and can grow and divide and so produce

other generations of amœbæ. In the centre of this tiny cell is a little black speck called the nucleus, which acts as the brain or the matter of the cell. The cell consists of protoplasm.

When the cells increase, we have the many-celled plant or animal, or human being. In these higher scales of life, we find an enormous increase in the number of cells, some of which are set apart in groups for certain objects. By means of the microscope, we can see the many millions of cells that form the protoplasm of the body. These cells are divided into groups, each having a particular work to do; some manufacture the digestive fluids that we heard about in a previous lesson. Some are blood cells, others are the message carriers of the brain, etc. Altogether, they form a mighty transport brigade, receiving the food, breaking it up and distributing it to various parts of the body.

THE HEART AND CIRCULATION

The heart is practically a hollow muscle and consists of four chambers and is the central organ of the circulation. From here the blood is sent through the arteries, which are strong and elastic in composition, usually deep below the surface of the body but coming near the surface at the wrists where we get the pulse, at the side of the neck, near the temple and on the inside of the ankle. This tells the heart beat, because the heart with each beat pumps the blood through the arteries, so the pulse and heart beat are the same. The arteries become smaller and smaller until at last they are the thinnest tubes, so that the blood is brought into contact with every cell of the body, to which it gives up the food it has carried, also some oxygen. It then collects the waste products

and passes through fresh channels which increase in size until they become blood vessels or veins which finally convey this impure blood, which is of a darker colour, to another part of the heart. It has to be purified afresh and so is pumped up to the lungs where it gives up its impurities, chiefly carbonic acid gas, which is breathed out, and takes up fresh oxygen which is breathed in, and so on through the heart once more. Thus the ceaseless circulation is kept up.

Alcohol increases the work that the heart has to do. It has been calculated by Sir Benjamin Ward Richardson, that if a man takes six ounces of alcohol (equivalent to about eight pints of beer containing four per cent. absolute alcohol) in the twenty-four hours his heart will beat seven hundred and twenty times an hour more than normally.

"Alcohol is bad for the blood-vessels, actually ruining them in excess, and even in moderation allying itself with all the other causes which make for degeneration."⁸

So that the metabolism or healthy working of the body is interfered with at its most vital part.

RED AND WHITE CELLS

If we look at a drop of blood through a microscope we would see two kinds of cells floating about. They are known as the red and white corpuscles. The red corpuscles are very tiny; you could put three thousand side by side and they would only occupy an inch; they are like little boats, concave on either side, and have a red pigment of colouring, held in place by a substance known as Lipoid. This red substance absorbs the oxygen and carries it to various parts of the body, where it is needed.

OXYGEN

Oxygen is a very important part of the air we breathe, and the water we drink. The composition is as follows:

Water—about 8 parts oxygen to 1 part hydrogen (by weight).

Air—about 1 part oxygen to 4 parts nitrogen.

If the little red cells cannot get their supply of oxygen, the person will quickly die. An instance of this kind occurred when many years ago one hundred and forty-six people were shut up in a little room all night; there was not sufficient ventilation, and the oxygen was quickly used up, and the air became poisonous. (We do not breathe out the same kind of air that we take into our lungs, some of the oxygen is absorbed by the red cells, and that which returns contains an impurity known as carbonic acid gas.) The result was that in the morning only twenty-three people were alive. That room is known in history as the "Black Hole of Calcutta."

Fresh air and pure water are essential to a healthy body, with proper breathing, which brings into operation the whole of the lungs; they will help to keep our army of red corpuscles well supplied with the precious oxygen.

When the microscope made a study of the body possible many old ideas were changed. Pasteur, the famous French scientist, discovered that some of these germs, now observed for the first time, were the cause of sickness. This was a wonderful stride forward in medical science. Then came Metchnikoff, who followed Pasteur's discovery with another one equally great. He observed that when enemy germs get into the body, that nature had already provided a defence army in the white cells or blood corpuscles.

WHITE CORPUSCLES

These little cells are known as the white corpuscles or "phagocytes," a Greek word meaning devourer. They are not quite as plentiful as the red cells, but they have an equally important work to do. We might call these little red and white cells the Army Service Corps, and the Infantry. The duty of the red cells is to keep the body supplied with oxygen, and of the white cells to defend the body against the enemy germs that frequently find an entrance. "It is now many years since the illustrious scientist, Professor Metchnikoff of Pasteur Institute, Paris, announced to the world his discovery that the white blood corpuscles have the power of destroying the microbes to which so many of our diseases are due. These white blood cells are the standing army or policemen of the body, and their duty is to attack, and if possible, destroy any foreign matter, such as dust or disease germs, which may gain an entrance. If microbes or chemical irritants are present in one particular part of the body, these white blood cells leave the blood-vessels in the neighbourhood in large numbers, and stream towards the point affected; they then attack the germs and seek to destroy them. In so doing many of them are destroyed. Fresh blood corpuscles are constantly being manufactured in the bone marrow, and when there are a large number of organisms to be attacked, as in a disease like pneumonia, the bone marrow produces them so rapidly that three or four times the normal number become present in the blood."⁹

There are also certain chemicals that develop in the blood, which help to destroy enemy germs, and their poisons.

Let us imagine that an enemy was invading Canada. Telegraph messages would be sent to headquarters.

Men would be called up to go to the place of invasion and prevent them from getting farther into the country. There would be the soldiers to fight, if necessary, the army service corps to carry the food, and those who are the sanitary officers. This is the kind of thing that happens in the body. When it is sick or hurt, millions of soldiers (phagocytes or corpuscles) rush along the railways (blood vessels) at the bidding of the high commander (the brain), only these railways would be able to enlarge themselves in order to accommodate the extra traffic. The soldiers (phagocytes) crowd to the place of invasion. While some carry the food, others carry off the waste products and remove the dead corpuscles. Fresh soldiers are rushed to the battlefield. Until the enemy had been completely destroyed, the extra soldiers would be supplied from the marrow of the long bones, where the corpuscles are formed.

In the case of a wound being poisoned, corpuscles form a living barrier around the invading germs. If the fight is severe, many of the corpuscles die, and their dead bodies cause the formation of "matter" or pus. Thus we see that these wonderful defenders have laid down their lives in the defence of their temple, the human body.

DOES ALCOHOL HELP?

The question follows, does alcohol interfere with the natural defences of the body?

In the first place, alcohol has an affinity for oxygen. This oxygen hunger causes alcohol to rob the blood of its loose oxygen, a fact which seriously interferes with the cells of the body.

Alcohol also has a special fondness for water. In its sense-deadening progress through the system, it robs the tissues of this fluid. This accounts for the horrible thirst

which follows hard upon the "morning after" indulgence in drunkenness.

Alcohol is one of the substances that can force an entry into the cells. The protoplasm cells ordinarily possess great powers of resistance; they can throw off or overcome the action of most poisons, and stop the entrance into their delicate interiors, of substances injurious to them. But that is not the case in dealing with this emperor of drugs; for alcohol, in common with the other narcotic poisons, ether and chloroform, has the power of penetrating all cell walls with the greatest ease.

PASTEUR INSTITUTE

In *My Magazine* of August, 1921, Arthur Mee, editor, says of the Pasteur Institute, Paris, "Here it was that science became a teetotaler, for it was in this Pasteur Institute that Metchnikoff made his immortal discovery of what alcohol really does. Through our bodies a river of blood flows ceaselessly between thousands of miles of living walls, and in this river swim more living cells than there are people on the earth. There are red cells and white cells. Each time we breathe our lungs receive a fresh supply of oxygen, the source of life, and it is the business of the red cells to call at the lungs for oxygen to be distributed throughout our system. Every red cell in our body pays twenty thousand visits to our lungs, and makes twenty thousand journeys through our system in the course of its short life; at the end of a fortnight it lays down its life and another red cell takes up its work.

The thing that was proved by Metchnikoff is that alcohol makes it hard for the red cells to carry out their work, so the body is ill and the white cells come into play. The alcohol that cripples the red cells, cripples the white

cells, too, and paralyses these defenders of our bodies so that we are helpless against attack. Again and again the great ocean of knowledge has swept onward in these famous rooms of Pasteur, but no more precious discovery has ever been made in them than Metchnikoff's. For we know now, once for all, that our bodies are battlefields, in which are living cells for ever fighting microbes, and the indictment on which science has sentenced alcohol to death is that it hinders the red cells in distributing life, and hinders the white cells in resisting death."

ALCOHOL AND RED CORPUSCLES

Alcohol injures the red corpuscles by shrivelling them, and thus making them less able to do their work of carrying the necessary oxygen. If much alcohol is present, some of the corpuscles are destroyed altogether. This results in a double evil. If less oxygen is carried in, less carbonic acid gas is carried out, and the body of the persistent drinker becomes weaker from lack of oxygen, and the blood is loaded with waste matter that should have been removed. The result is lowered vitality and predisposition to disease.

ALCOHOL AND WHITE CORPUSCLES

Under the microscope it is demonstrated that even a moderate quantity of alcohol absorbed into the blood paralyses the white corpuscles (phagocytes). They behave like drunken men; they cannot move fast enough to catch the disease germs, and when placed in the midst of a clump of malignant microbes, are unable to kill and devour them. In the chronic alcoholic the microscope shows that the fighting powers of the white corpuscles are permanently reduced. This accounts for the lowered vitality of heavy drinkers—and to a lesser extent of any

drinkers—and explains why pneumonia, typhoid, or grave infectious diseases, are so fatal among them.

THE LESSON APPLIED

There are thousands of sick people in hospitals and institutions, many of whom are there because alcohol has poisoned their bodies and disease is the result. The little white soldiers have been put out of action and the disease germs have conquered.

Someone has said, "You never get ill if you keep well." That is not as foolish as it sounds. In other words, if your body is healthy and your little soldiers in good working order, you are not as liable to become a victim to disease. When the body is healthy the enemy germs find a wakeful, alert, efficient army in possession. The resistance against their invasion is so strong that they are unable to take possession, and the body remains healthy. These defenders guard the gates of the city of Health, and anything that lessens their efficiency and powers of resistance is an enemy to be feared more than plague or disease, for if they fail in their work, the gates are unguarded, and the enemy is victorious in forcing an entrance and capturing the city.

ILLUSTRATIONS

The story is told of two Japanese officers in the Russo-Japanese War who lay side by side in a hospital. One was wounded in the lung and the other in both lungs; they both had the same care and attention, yet a strange thing happened. The officer who had the most serious wounds got better first; the other was a whole month longer in hospital. He was very much puzzled and inquired of the doctor why his friend should get better first. The doctor told him that his friend's blood was pure and healthy. "Yours," he said, "has been

poisoned by alcohol; that is why your wounds are so slow in healing." The officer thought seriously about what the doctor had said. When he returned to the army he told the men about his experience, and they decided that as they wanted to keep fit and healthy, they, too, would stop taking drinks that contained alcohol.

Roman history provides the following story of a little girl called Tarpeia. She was the daughter of the Governor of the Citadel of Rome. The Sabine Army was outside, waiting to get in and destroy the soldiers who guarded the Citadel, but they could not because the gate was locked. Tarpeia went outside to draw water from the public well; she was very much struck with the bracelets the soldiers were wearing on their left arms; the soldiers wanted to get in and they asked Tarpeia to unlock the door; she promised to do this if they would give her those things they had on their left arms; they made the promise and Tarpeia stole down and, with her father's key, opened the gate. As the soldiers rushed in they threw their bracelets, also their shields on top of Tarpeia, who was crushed to death beneath the weight.

Alcohol unbolts the gate and lets the enemy into our beautiful temple, which we call the body.

DEFEAT OR VICTORY? (SENIOR)

The work of the phagocytes in defending the body against disease is only part of the marvellous mechanism in the blood. Dr. Weeks describes this for us as follows: "With a microscope we can see the phagocytes at work, but there are other allies which can only be investigated by modern chemical and bacteriological methods. Thus there are substances in the blood which have the power of making germs stick more closely together, so that the germs are engulfed more easily by the corpuscles, these

substances are called Agglutinins. Then there are substances which have the power of increasing the activity of the corpuscles, and making the germs more vulnerable to the attack. These are called opsonins (derived from a Greek word which means to provide victuals or provide a feast).

It is possible to measure this power which is termed the "opsonic index" and one of the reasons for many of the "injections" that were given during the war and since is to increase this opsonic index in the individual against certain diseases. As with the phagocytes, so with the opsonins, such evidence we have shows that alcohol reduces the index. Thus Professor Charles Stewart found in certain individuals that after taking two ounces of port wine, there was an average fall of thirty-seven per cent. in the index against infection by the tubercle bacillus, and forty-two per cent. in that against the germ which causes blood poisoning."¹⁰

Questions:

- (1) What sort of cells are found in the blood?
- (2) What is the duty of the red cells?
- (3) What is the duty of the white cells?
- (4) Does alcohol help them to carry out their work?
- (5) Why?

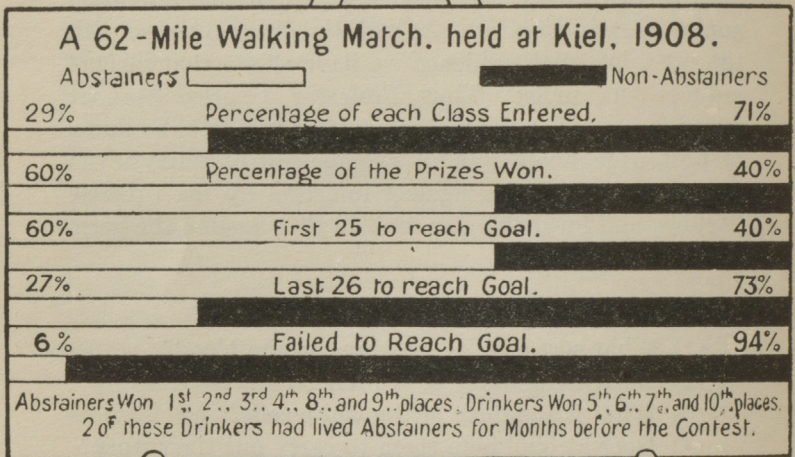
LESSON NO. 7

THE LINES OF COMMUNICATION

TEACHERS' NOTES

CHART No. 7—"The Lines of Communication."

Blackboard—



American Scientific
Temperance Federation

Object Lesson—Pictures of Nerve Fibres. "Alcohol and the Human Body."

Experiment—Bottle of alcohol and one of water—so much alike in appearance. Pour some water into a vessel, apply lighted match; light is extinguished. Pour out some alcohol, repeat experiment, which shows that alcohol though like water in appearance, is very different in effect. To show how intense is the heat of the flame,

sprinkle into it some iron filings (obtainable at a wholesale chemists). There will be a display of white hot sparks.

Memory Sentence—

There are two freedoms—the false, when a man is free to do what he likes; the true, when a man is free to do what he ought.

Scientific Thought—“He who takes alcohol is living in the present at the expense of the future.”—Sir T. Lauder Brunton.

*Aim—*To teach how the nerves of the body work in conjunction with the brain, and how alcohol interferes with this wonderful machinery.

THE LESSON

The nerves are bundles of fibre which run from the skin, and senses to the brain and spinal cord, and from the brain and spinal cord to the muscles. The nerve fibres are covered with a substance called Lipoid, which prevents the messages from spreading, and from losing their effect. Lipoid is a very important substance. It is the native constituent of every living cell, and anything that injures Lipoid is regarded as a dangerous enemy to the body.

These wonderful nerves that are spread over our body have very important work to do. Some are placed near the surface of the skin, and send messages to the brain. There would be no sensations of pain or pleasure, cold or hunger, if it were not for these tiny fibres, which report to the brain what is happening. The brain and spinal cord then send back messages to the muscles, etc., and they act accordingly.

For instance, if you were getting into your bath, and the water was too hot, the nerves from the foot would send a message back to the brain, “water too hot,” and

the message back would be "take your foot out." You may think that it is impossible for a cry of alarm to go up and an answer be received back in the time between when you feel the water hot, and you draw your foot away, but that is what has happened. These messages travel at the rate of from ninety to one hundred and thirty-one feet per second, and the answers travel to the muscles at the rate of one per sixteenth to twentieth of a second.

Helen Keller, who is blind and deaf, has found these little nerves exceptionally valuable; for her they are also eyes and ears. It is possible for her to enjoy music with her hand on the piano—her sensitive nerves tell her what kind of music is being played; also, with her fingers on a person's lips she can tell what they are saying. The nerves in her fingers send their messages to the brain and she can thus follow their conversation. Helen Keller is the best educated deaf and blind person in the world, having received a university training, and all her knowledge has been acquired through her finger tips. The most difficult accomplishment of all was learning to speak. She could not hear how people pronounced words, nor even see their lips as they spoke, but with her fingers on the lips and muscles of the throat, she has learned how to pronounce words, and now speaks almost naturally. This experience teaches us the value of those little nerve fibres that are perhaps only second in importance to the brain itself. A nerve specialist speaks of the nerves as "filaments of brain scattered over the body."

The nerve system is similar to our Telephone Exchange with all its lines carrying messages to and fro, but the exchange is very clumsy in comparison with the nerve communication of the human body.

THE MUSCLES

The strength of the body is in the muscles of which there are five hundred. Each muscle is made up of a number of strings or fibres tightly bound together. Four hundred of these fibres would cover a space not more than an inch wide. The whole muscle consists of a large number of these bundles of fibre, each bundle being covered with a thin skin or membrane. The fibres are attached at each end by cords or tendons to the bones. They form nearly half of the weight of the body (forty-three per cent.). They use up starchy food and oxygen and form as waste matters carbonic acid gas and other waste products.

The fibres of these muscles are acted upon by the nerves under the control of the brain, and at our will are able to thicken or shorten as can be seen by the muscle of the arm. The nervous system is so closely allied with the movement of the muscles that it is practically impossible to study the effect of alcohol on the muscles alone. The movement of the muscles in response to our great commander, the brain, is not as simple as might be imagined. When a voluntary muscular act is performed a nerve centre does not send out one single gush of energy or "message" but a rapid intermittent stream of impulses at the rate of about twelve per second. The shaky hand of the drinker is one of the obvious demonstrations of the effect of alcohol on the nerve centres that carry these messages to the muscles. They no longer work in complete harmony because of the effect of the drug.

There have been many and varied tests by scientists in all countries and there is a vast amount of evidence that alcohol interferes with this wonderful and intricate piece of the machinery of the body.

TESTS

TYPESETTING

Dr. Aschaffenburg made some tests at Heidelberg; four men, who were skilled typesetters were given a moderate quantity of wine and fifteen minutes after they began their typesetting (three of the men were moderate drinkers and one drank to excess occasionally). On the first and third days they had no alcohol; on the second and fourth days they had wine, which, of course, contained alcohol. For fifteen minutes each day they worked hard and fast. In every case they imagined that they were doing better work when they had had the wine, but the reverse was the case. The results of each man's work is seen in the columns given on Chart No. 7.¹¹

SHOOTING

These tests prove two things, (1) that the nerves cannot carry the messages to the brain as quickly under the influence of alcohol, and, (2) that alcohol cheats people into believing that they are doing better work. Other experiments were tried with shooting. Men with, and without, alcohol were tested—in every case those who were free from alcohol put up a better record, and the more complicated the test the greater was the difference. For instance, if they were to shoot when a flag appeared there would be only one message to the brain, and, in consequence, those who had the alcohol were not so very far behind, but if they had to shoot if the flag was a certain colour—there would have to be two messages, first, the appearance of the flag, and, second, to ascertain what its colour was. In this list, the drinkers were much behind the abstainers. The teams were then reversed and the men who had won on the previous day were given the alcohol, and the others allowed to do without. The

same thing happened—the drinkers lost every time. The reason, of course, is obvious. The nerves of the eyes and the muscles were under the influence of a drug. It took the eyes longer to send their messages to the brain, and also longer for the brain to send its messages to the muscles.

Athletes and most men that desire to excel in any particular test know how foolish it is to take drinks containing alcohol. Professor Cheshire says: "Captain Carver was the champion rifle shot of America; on one occasion I saw twelve glass balls thrown into the air by a spring, and, by a repeating rifle the whole twelve were shattered by Captain Carver before one had reached the ground." When asked if intoxicating drinks influenced his shooting, he replied, "If I were to drink, I couldn't shoot."

TENNIS

William T. Tilden, of Germantown, Pa., America's champion tennis player, published a series of articles on "How to Play Tennis." Certainly no man is better able to speak with authority than Mr. Tilden. The following paragraph is quoted from one of that series of articles: "It is certain injury to touch alcoholic drink in any form during tournament play. Alcohol is a poison that affects the eye, the mind and the wind, three essentials in tennis."

ROWING

The Murray Bridge (S.A.) eight-oar team, which carried off the Australian championship in Sydney (1922) consisted entirely of abstainers.

FOOTBALL

Amos Alonzo Stagg, famous football coach of the middle west United States, said before the Senate Judici-

ary Committee in 1926: "As a coach I do not believe, and none of the coaches that train men believe, in the use of alcoholic beverages. I was a member of the coaching staff of the Olympic team two years ago (1924) and that was one of the forbidden things when we went over to Paris, that the men were not to drink anything except water and we took spring water with us and found after we had a chemical analysis made of the water over there, that it was purer than what we took over in our casks. Now the American athletes stand on the top—the only ones that approximated us at all were the Finnish athletes and they do not use liquor."

ALCOHOL A DRUG AND NOT A STIMULANT

Alcohol is often spoken of as a stimulant by people that should know better. It is a narcotic drug and when taken into the body is carried by the blood stream to the brain. There it paralyses the cells and because the person acts in an unrestrained fashion on account of his loss of self-control, people imagine the brain is stimulated, when it is really drugged.

"The popular idea that it (alcohol) is a stimulant, proves on examination to be scientifically untenable."¹²

Tea, coffee, wine, beer, spirits, are sometimes all spoken of as "stimulants." Scientifically, such grouping together of substances which have a totally different physiological effect on the body is unwarrantable. "Tea, cocoa, and coffee, have no depressant after-effect. Their exhilarating influence has no reaction stage to follow, neither do they cause degeneration of the tissues of the body; hence they are entitled to be called 'stimulants.' On the other hand, alcohol in all its forms, has a prolonged after-stage, and insidiously sets up widespread tissue degeneration, for which reason it is a misuse of terms to call it a stimulant."¹³

"The popular belief in the stimulating properties of alcohol, as regards nervous and other functions, seems to be of purely subjective origin, and illusory. The apparent stimulation is in the main, if not wholly, an effect of the narcotic influence of the drug, which, as we have seen, dulls the drinker's perception of unpleasant conditions in himself and his surroundings, and may make him feel better, more efficient, and stronger than he really is."¹⁴

THE LESSON APPLIED

A person who is under the influence of alcohol, though not unconscious, will be partly drugged; even a small dose will prevent the nerves from doing their proper work. All experiments in regard to the effect of alcohol on the nervous system proves that its harmful effect is noticed in:

1. Less power of self-control.
2. Less rapidity of thought.
3. Less accuracy of judgment.
4. Less sharpness of sight.
5. Less capacity of muscular action.
6. Less steadiness of hand.

These results show the effect of the poison on the delicate nerves and long before a person shows the slightest sign of intoxication, the brain is injuriously affected by the presence of alcohol. A little drink does some harm, a larger quantity does more, and so on until complete intoxication is reached, when all the senses are in a state of suspension, and it follows that every drop of alcohol taken must have done some part in contributing to the injury. To have the clear brain, the quick eye, the steady hand, and the cool nerve, it is necessary to abstain from all forms of alcoholic liquors."¹³

ILLUSTRATION
A GREAT SURGEON'S MOTTO

Dr. Lorenz, the eminent European surgeon, emphatically declares the danger of alcoholic drinks. A banquet was given in his honour in New York city, and wine was served. The eminent guest declined it, and politely requested the waiter to bring him a cup of tea. This caused him to be asked if he were a total abstainer from the use of wines and other liquors. His answer was as follows: "I cannot say that I am a temperance agitator, but I am a surgeon. My success depends upon my brain being clear, my muscles firm, and my nerves steady. No one can take alcoholic liquors without blunting these physical powers which I must always keep on edge. As a surgeon I must not drink."

IS ALCOHOL A FRIEND OF THE NERVES? (SENIOR)

You will remember that earlier in the lesson we discovered that Lipoid forms part of every living cell, and a covering for the nerve fibres. Professor Osborne, M.B., Ch.B., D.Sc., Prof. of Physiology, University of Melbourne, says: "You may ask, what has this to do with alcohol and temperance? But the connection is a very important one, for only a few years ago two physiological investigators—one with the English name of Overton, and the other with the distinctly German name of Hans Meyer—without collusion and without knowledge of each other's work, made one of those strokes of the pen which at once cleared up a whole host of problems. These two investigators independently discovered the principle that any substance which dissolved Lipoid, or what is the same thing, was dissolved in Lipoid, was anæsthetic. Chloroform, ether, ethyl-chloride, and those agents which are used in modern surgery to produce unconscious-

ness, are all dissolvers of Lipoid, for from the chemical standpoint the two things mean the same.

Then the generalization was extended. Not only do such substances act as anæsthetics, but they act as poisons to every living cell in the body. Not only does chloroform lull the conscious to sleep, but it depresses every organ of the body as well, and the reason why chloroform is used is simply that the brain, owing to its high percentage of Lipoid, is more sensitive to the action of chloroform than other organs of the body. So that one who administers chloroform, ether, ethyl-chloride, or one of those anæsthetizing agents, is really adding something to the Lipoid of the body, and because the brain happens to have so much of that material, the first and most obvious paralysis is the paralysis of consciousness.

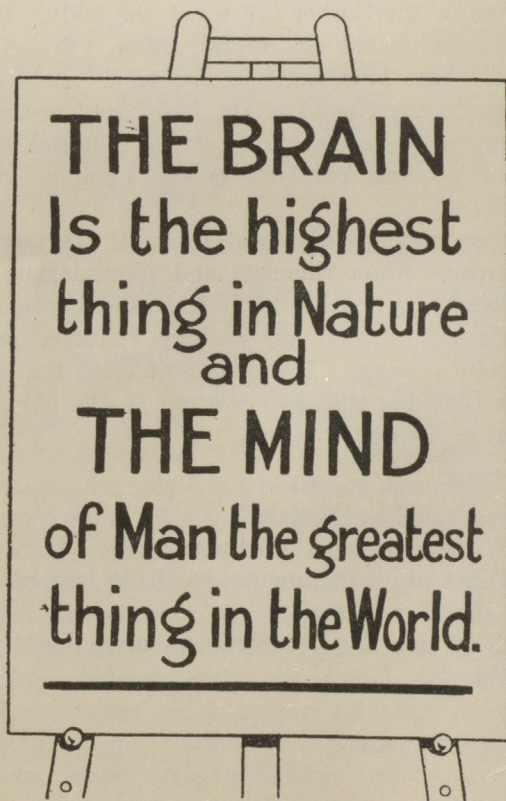
Now we come to the next thought. It was not a great surprise when chemists and physiologists found that alcohol was soluble in Lipoid, and hence alcohol is now classed, without any apology whatever, amongst the narcotic poisons. The mere statement that alcohol dissolves Lipoid is sufficient warrant to the physiologist to rank it as a narcotic poison."

Questions:

- (1) Is alcohol a stimulant?
- (2) What effect has it on the nerves?
- (3) What do experiments teach in regard to its harmful effect?
- (4) What does Prof. Osborne say alcohol is?
- (5) Why?

LESSON NO. 8
THE GREAT COMMANDER
TEACHERS' NOTES

CHART No. 8—"The Great Commander."
Blackboard



Object Lesson—A bottle of ethyl alcohol. Explain that it is the presence of this poison in certain drinks which causes them to be termed "intoxicating."

Experiment—Take the white of an egg, which is most like the human brain of any substance that we can see. Put it into a bottle and pour in some of the alcohol. Shake together, then observe how the alcohol causes the white of the egg to coagulate.

When alcohol reaches the brain, it is still alcohol, diluted in the blood stream. "It is generally accepted that with a blood content of over 0.6 per cent., there is a considerable likelihood of death."¹⁵

Memory Sentence—

"He that is drunken—he has lost the reins; is outlawed by himself."—George Herbert.

Scientific Thought—"The first things to go are . . . the crown of his education."—Prof. Starling, M.D., F.R.S.

Aim—To teach that the brain is the seat of government, and that anything that injures the brain, injures the greatest gift that man possesses.

THE LESSON

In previous lessons we have learnt something concerning the functions of the body, but after all, important as are the cells and nerves of the body, every organ is absolutely dependent on the brain, even the heart and lungs, which are doing their work when life begins, are controlled by the brain. This marvellous and delicate organ is made up of cells numbering about three billion. The nerve communications from all over the body are connected up with the brain. What you see, what you hear, what you smell and taste, what you touch, what

hurts, and what gives pleasure, are all recorded in the brain, and messages are sent to whatever part of the body is to be called into action. For instance, when you read, the eye nerves send their message to that part of the brain which controls the sight, and you know what the words mean. In reality you see with your brain. People often read passages without thinking what they are reading, and they do not know a word that the eyes have seen. The sight was all right, but the mind was not working in co-operation with the eyes. People will look at their watch, then put it away, and if you ask them the time they could not tell you; the mind has not taken notice of the message sent by the eye nerves, being busy with something else. The same applies to hearing. People may speak to us and we may answer in an abstracted way without realizing what has been said. This helps us to understand how important the brain is, and though we are conscious of events only through our nerves, it is the brain which receives the impression.

The brain of an infant is, of course, small and the cells few, but as the child grows and the brain develops, the cells become more numerous. The brain cells are the store houses of the intellect, and in consequence, the fewer the cells the duller the brain, and the more numerous the cells the finer the brain.

In animals, from the lowest to the highest, we have a graded scale of brain structure, from the simple to the more complicated. The cells of the brain are not only a power house or battery, but something more. They have the power of keeping themselves in working order for a hundred years. The brain cells are influenced for good or ill by every sight or sound, by food and drink, by environment from without, by every other organ of the body, and by every thought and feeling from within.

ORDER OF DEVELOPMENT

A suggested outline of the development of the brain is here given roughly under five headings. It is wise, however, to remember that these centres are not entirely separate, though we separate them for convenience sake. The nerve cells in each "group" interdepend in a marvellous way, and even though the voluntary muscles in number three classification may not yet be under perfect control, the knowledge cells will be forming. Thus we name the order of the brain's development as follows: (See Chart No. 8)

1. Heart centres.
2. Lung centres.
3. Locomotion.
4. Knowledge.
5. Inhibitory, self-control or moral centres.

One and two are in working order in infancy, three (locomotive centres) develop with the little child learning to walk and to use its muscles, four (knowledge centres), develops through life, five (self-control centres), is the very last to come and the most important. It is like the reins that guide the course of all the other faculties.

Let us consider the order of development. One and two are necessary to life, as they control the heart beat and respiration; number three is connected with the control of the voluntary muscles; therefore, if it does not develop—there is a form of life, but little or no control of the muscles; such persons are called idiots. If number four centres are arrested in their growth, such a person will be an imbecile, having little or no power to acquire knowledge. If all these powers exist and number five development is arrested, such persons will have only a limited sense of right and wrong; there will be little

power of judgment, and the moral sense will be undeveloped, such people are designated as feeble-minded or morons, and they often become criminals.

As the growth of the brain is in order of sequence, the centre we speak of as number three will not grow unless number two exists, and four will not grow unless number three exists, and number five will not grow unless number four exists.

There are, of course, many grades of feeble-mindedness, and it is very difficult to draw distinct lines of demarcation between the grades, but the order of development is always the same.

Though we have, for convenience sake, considered this order of development in five divisions, they are often spoken of as three divisions, grouping one, two and three under one head, as the brain cells that have to do with the physical. Number four which are the intelligence centres, as mind, and number five, with its power of free-will to choose between moral issues, as soul.

Again we would draw attention to the fact that these divisions are not well marked, and, from a purely scientific point of view, we ought not to divide the compartments thus. If, however, the teacher will bear this in mind, the divisions are helpful to enable us to understand the order of growth. Science, so far, cannot explain where these later cells are located in the brain, but they do know that they are the last to develop, and that they develop in the order given.

In the study of the effect of alcohol on the brain, it will be noticed that the divisions are the same; only the effect of the drug on the brain cells is in the inverse order of development, the top or crown, being the first place to feel the attack of the drug.

THE EFFECT OF ALCOHOL ON THE GREAT
COMMANDER

Since the brain is such a wonderful machine, and our most priceless possession, it is inexpressibly stupid to uselessly expose it to the slightest risk of injury. Through the brain alone can we enjoy happiness, or achieve usefulness and success. Only through the brains of the people can the nation be intelligent, progressive and honoured. Nature has protected the brain from ordinary damage from without, by the formation of a thin membrane, called pia mater, or tender mother, another thicker membrane, called dura mater, or hard mother, and then the hard bony case known as the skull.

The chief danger to this delicate instrument is from poisons within. Doctors tell us that many cases of idiocy are due to poisons circulating in the brain. Insanity is also frequently the result of brain poisons, the most frequent being alcohol. Alcohol has a specific affinity for the brain centres. Its first influence is to irritate and excite, then to paralyze. It is possible to develop all the brain centres and for them to be injured by poisons, the chief of which is alcohol.

ALCOHOL AND SELF-CONTROL

When alcohol is taken into the body, it makes its way through the tissues to the blood stream, which is gathering up its food and oxygen to carry to the various cells of the body. It is still alcohol, and the little red and white cells feel the influence of this invader. The red cells are robbed of some of their oxygen, and the white cells are rendered less active, but on goes the stream with its new burden, every beat of the heart sending the alcohol on its journey.

The cells in one, two and three developments are the ancient heritage of the race; they are strong and sturdy,

and are not so easily injured (see difference in appearance of cells, Chart No. 8), but the later cells are finer and more delicate. They are, therefore, more susceptible to the influence of the poison. Alcohol attacks, first of all, the crown of our education; the last thing learned will be the first to go, and it will be, for the time being, as though the individual had never possessed that particular knowledge.

Kraepelin says: "The powers of conception and judgment are, from the beginning, distinctly affected, although he who takes the alcohol is quite unconscious that it has this effect. The actual facts are exactly the opposite to the popular belief. I must confess that my own experiments, extending over more than ten years, and the theoretical deductions therefrom, have made me an opponent of alcohol."¹⁵

Following are some scientific observations: "Now of all the intellectual functions, that of self-criticism is the highest and latest developed. . . . Alcohol undoubtedly diminishes the control of the intellect and the will over the emotions. The drinker's conversation and actions become less restrained; all his emotional responses are freer and fuller than in his normal state."

"The successive stages or phases of intoxication cannot be sharply distinguished, and every case presents its peculiar combination and succession of features, varying with the temperament and disposition and character of the individual, and the circumstances of the moment. But three main stages may be broadly distinguished . . . the first stage, that in which the highest or intellectual brain level is alone distinctly affected, as described above.

"The second stage is that in which the functions of the intermediate level, sense perception and skilled

movement, are invaded and disturbed. The drinker begins to show a certain clumsiness of behaviour. . . . At this stage, also, his perceptions are impaired, his field of sense observation is narrowed, the fineness of his ear, of his taste, his touch, his vision, is blunted; . . . The impairment of his intellectual functions being further advanced than in the first stage, and the functions of the third or lowest cerebral level, that of the emotions and instinctive impulses, being still relatively intact, he is apt to give way to clumsy but violent displays of emotion, characterized by the exclusive dominance of each primary emotion in turn.

"In the third stage, the intellectual processes of judgment and self-criticism and control are virtually suspended; the functions of sense perception and skilled movement are grossly impaired, and the emotional tendencies themselves are invaded and weakened, so that only strong appeals suffice to evoke any response, and, in their absence, the drinker sinks inert and nerveless into a heavy sleep, which lasts until the alcohol absorbed has been all oxidized.

"The successive stages may be noted.

"1. Uncritical self-satisfaction of the subject with his own performances.

"2. Disregard of occurrences and conditions normally evoking caution of act and word.

"3. Trespass of rules and conventions previously respected.

"4. Impaired appreciation of the passage of time.

"5. Loquacity.

"6. An argumentative frame of mind."¹⁶

Thus we see that if a person continues drinking, he will poison number four development; his mind is tem-

porarily deranged. Still further doses of the drug penetrate to number three development and interfere with his powers of locomotion; his muscles fail to respond to the messages from the brain. The nerve communications are broken down and the person is in a serious condition.

Some men have taken a great quantity of drink for a wager and have dropped dead as the result. The alcohol has poisoned all the brain cells right down to those controlling the heart, and death is the result. A large dose of alcohol will kill a person, half that amount will seriously affect the nerve centres, half the amount again and the damage, though not so serious, is evident, and so on down to the smallest amount which affects adversely the brain of any human being.

THE LESSON APPLIED EFFECT IN EMERGENCY

Supposing the commander gets word of an emergency, such as a motor accident, the hands are holding the steering wheel of the car, the driver has had a drink of alcoholic liquor, something unexpected happens, action must be instantaneous, the commander is late in getting the message, for his one-time trusted messengers, the nerves, are poisoned, and it has taken them longer to get their message to the seat of government. At last it arrives, and the commands to the muscles are sent out, but alas, it is too late; the messages moved too slowly and someone is hurt, sorrow follows and the newspapers say that it was an accident, but the truth is that alcoholic beverages add one more to the long list of calamities for which they are responsible.

It may be that the person has to decide between right and wrong. The message goes to the brain. Conscience is not alert and does not give its best judg-

ment, so it is easy to choose the wrong and hard to choose the right. The grip on the things that matter most is loosened and the path downward from life's previous high standard is commenced. The moral sense is injured—vice does not look so repulsive, when the brain is drugged. The still small voice that warns a person against evil is silenced, for the time.

THE LESSON ILLUSTRATED

The story of "The Wreck of the *Baltic*."¹⁷

The *Baltic* is about to enter the harbour, Captain Gibson promises the passengers that they will be ashore for breakfast. A discussion takes place about intoxicating drink. The captain boasts that he never was drunk in his life, and that he never takes more than one drink when they are getting into port. Later on the message comes to the captain that they are running into a fog. The chief mate asks the captain if they will slow the ship down. The captain answers: "Slow her down? Certainly not! I said we'd be in port by 8 a.m., and I'll be up to time or perish in the attempt."

Dr. O'Sullivan, who had taken up the argument for total abstinence from alcohol, becomes uneasy; he remarks to his companion: "The captain fails to inspire me with confidence."

Dr. O'Sullivan continues: "If half the truth were told, my boy, many of the greatest railway collisions, disasters in war, wrecks at sea, would be sheeted home to the clouded judgment of those who had acquired greatness in inspired confidence during the period of their normal brain activities, but whose brain degeneration from so-called moderate drinking had gone undetected till the appalling evidence came in some great catastrophe."

"It is not the number of times a man is drunk in a lifetime, but the cubic inches he has daily consumed that

measure the injury that alcohol does. The captain's brain cells, his judgment cells, his higher cells, have undoubtedly degenerated under the daily alcoholic bath with which he has supplied them for years, and the degeneration will not be revealed till the test comes and a disaster follows, and it is too late."

"Breakers to starboard, sir," shouted the third mate.

"Hard-a-port," shouted the captain, then apparently recovering from his dazed condition and realizing the position, he reversed the order. The utmost confusion prevailed, the steering gear had given way as a result of the sudden change of orders. A cool, correct command to the engine-room, or a similar one to the man at the wheel, would have saved the ship and a hundred lives. But it is too late.

Captain Gibson was the first to find a watery grave. No doubt the fog was blamed for the catastrophe, but the cause of the disaster and many others like it was alcohol.

THE CENTRAL NERVOUS SYSTEM (SENIOR)

The central nervous systems consist of the brain, the spinal cord, and the nerves arising from the brain and cord. The spinal cord is only a little thicker than a lead pencil and that of a man weighs about an ounce. The brain weighs about fifty ounces; its main divisions are the cerebrum, or large brain, the cerebellum or small brain, and the medulla which contains many nerve fibres that connect the higher parts of the brain with the spinal cord, and in which are placed the vital centres without which life would cease, such as the heart controlling centre, the heat regulating centre, etc.

Chart No. 8 helps us to understand "that a large portion of the brain surface is divided into compartments or areas for different duties. . . . Here im-

pressions are received and impulses sent to the muscles, every nerve centre having of necessity a receiving or sensory part and an outgoing or motor part. "The same areas or centres are places where the memory of movements, of touches and muscular strains are recorded."¹⁸

This is the wonderful machinery of the mind, and "as frost would nip the tender growing fibres of a plant, so does alcohol specially nip the tender growing dendrites."¹⁹

Sir Victor Horsley says, "The intricate and controlling mechanism by which all our bodily functions are regulated and maintained in action is called the nervous system. It is the machinery of our thoughts, our emotions, our memory; it directs the movement, voluntary and involuntary, of every muscle; it controls the secretion of all our glands, and governs, in fact, every function of the body. When the whole body is starved, the nervous system is the only part which at first does not lose weight, in fact it lives on the other tissues and at their expense. Its influence cannot, therefore, be overestimated, and it is imperative that every one should possess sufficient knowledge to realize both the importance, and at the same time, the structural delicacy of this part of our body, in order to save it as far as possible from wrong and reckless treatment."²⁰

"Alcohol weakens and suspends the hierarchy of functions of the brain, and therefore of the mind, in the order of their development in the individual and in the race. For the emotional dispositions or capacities are a very ancient racial endowment and have their physiological seats in the basal ganglia, the lowest levels of the great brain, the part which alone is represented in the brains of the lower vertebrates. The higher intellectual faculties, on the other hand, are the latest acquired and are connected with the anatomically highest and last

developed parts of the brain. Intermediate between these come, in the order of development, the sensory and skilled motor functions (and their nerve centres.")²¹

The human race, through centuries of experience and education, has developed until it stands on the heights of achievement, moving forward at a marvellous rate. Whether in the individual or in the race, this wonderful brain power is the seat of government, the power by which man climbs to higher things. It is, therefore, the height of folly to use as a beverage that which lowers the standard of the individual and so retards progress along many lines.

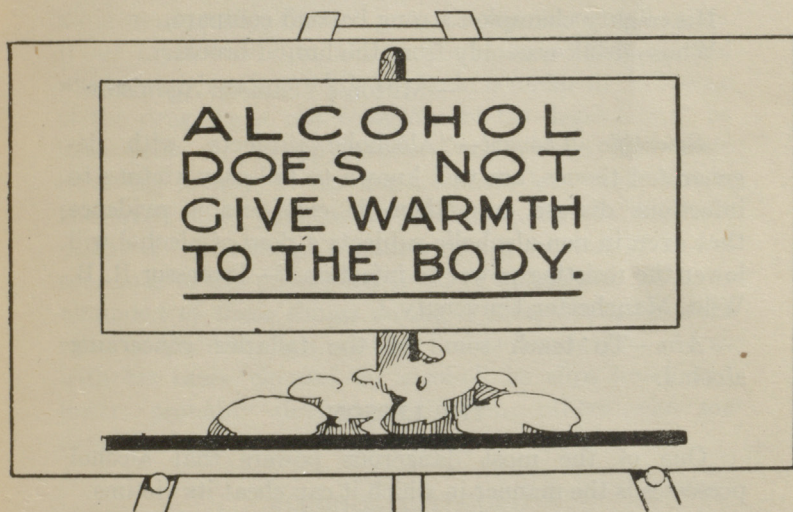
Questions:

- (1) What is the order of brain development?
- (2) What is the effect of alcohol in regard to a person's behaviour?
- (3) Why?

LESSON NO. 9
THE GREAT DECEIVER
TEACHERS' NOTES

CHART No. 9—"The Great Deceiver."

Blackboard.



Object Lesson—Picture of an explorer.

Experiment—Alcohol not only prevents food substances from dissolving in water, but it has the power of precipitating substances from their solutions. Make a saturated solution of salt by putting two or three lumps of salt in a boiling tube, add water and boil. If all the salt dissolves add more until it is found that some remains at the bottom of the glass undissolved, no matter how much it is stirred; cool the liquid; the clear water above is a

saturated solution of salt in water. Pour some of the clear solution off into a test tube, and add alcohol. As the alcohol is added the salt will be thrown out of solution and precipitated to the bottom of the tube.

Memory Verse:

Oh, madness to think the use of strongest wines
And stronger drinks our chief support of health,
When God, with these forbidden made choice to rear
His mighty champion strong beyond compare,
Whose drink was only from the limpid brook.

—Milton's "Samson Agonistes."

Scientific Thought—"Alcoholic subjects, with degenerated tissues, are well known to fall easy victims to infectious disease, and there is considerable evidence that even in non-alcoholic subjects a dose of alcohol will lower the resisting power to infection."—Professor R. B. Wild, Manchester University.

Aim—To teach some of the fallacies concerning alcohol.

THE LESSON

One of the most dangerous powers that alcohol possesses is the manner in which it can cheat its victims.

In our previous lessons we have recognized the fact that alcohol is a drug which poisons the brain, thus interfering with the judgment, memory and will-power of the drinker. Under the influence of this drug, men believe that they are better, when they are worse, stronger when they are weaker, more capable when they are less capable, working faster when the reverse is the truth. This is the most dangerous influence alcohol has, because if the drinker knew the truth he might change his ways. Alcohol works a gradual change in the will-power.

When a man starts drinking and sees around him some of his friends who have been ruined through drink, he thinks to himself, "My will is stronger, and I know when to stop"; he trusts his judgment and his will-power, but after alcohol has had a chance to influence the brain it changes that judgment and weakens the will, and things do not appear to be the same to him. When he first started to drink he would refuse to take more than one, but after his brain has become accustomed to the drug he is more easily cheated into having more and more. If his brain was normal, he would know that alcohol was hurting him, but while his brain is under the influence of the drug, he is not conscious of his degradation; he loses pride in his appearance, and things that were revolting to him in his normal state lose their terror. His loved ones, perhaps, are suffering, but he does not realize it. The home comforts disappear, but he is not conscious of the downward trend of his affairs. If he is reminded of these things during a sober spell, he seeks relief in the drug again, which makes him forget, and so with his brain clouded by alcohol, he slips lower and lower, probably dragging with him others who are dependent upon him for care and protection.

ALCOHOL AND COLD

Alcohol also cheats people into believing that they are warmer after a drink containing this drug, but all experiments prove that this is untrue. The drinker feels warmer because the blood has been forced to the surface of the body. The effect of this is that the deep temperature, which is of greater importance than the surface temperature, has been reduced. The body is left at a lower temperature than before. The body has a covering of skin to protect the blood vessels and delicate membranes

from harm. This skin has a wonderful work to do. We know that the body must get rid of certain waste matters, and one method is by perspiration, so that all over the skin are placed little waste pipes, numbering about two and a half million, whose special duty is to get rid of waste material. When the body is too hot, the openings of these little pipes expand; in this way the body gets rid of the heat. When the weather is cold the pores partly close to keep the heat in the body, which is not required in the skin, but for the internal organs. The action of alcohol is to cause these pores to expand, thus the face of a heavy drinker is red from the constant dilating of the blood vessels, while the drinker thinks he is warmer because his skin is hot and flushed; the truth is that again he has been cheated. The heat of his body has been reduced. For this reason alcohol is not used by arctic explorers.

Captain Kennedy, who spent very many months in the frozen regions, states that when engaged in the search for Sir John Franklin, he and his crew (all abstainers) were able to effect more than any of the crews of the other thirteen vessels that went out in the same year, but which were not sailed upon total abstinence principles. His crew journeyed on foot, when others either could not or would not, and they covered far greater distances than the others—returning home with all hands and in a better condition than any crew that had ever, up to that time, returned from Arctic regions. These sentiments were shared by explorers like Capt. Scott, Sir Ernest Shackleton, Prof. David, Dr. Nansen and Lieut. Perry, who have found out the truth concerning alcohol and cold, and refuse to be cheated into making the popular mistake.

Dr. Ross says:

"I was twenty years older than any of the officers or crew, yet I could stand the cold better than any of them, who all made use of tobacco and spirits. I entirely abstained from them. The most irresistible proof of the value of abstinence was when we abandoned our ship and were obliged to leave behind us *all* our wines, and spirits. It was remarkable to observe how much stronger and more able the men were to do their work, when they had nothing but water to drink."—Sir G. Ross, "Voyage to the Arctic Regions (1829-93)."

Dr. John Rae, Arctic explorer, says: "The greater the cold the more injurious is the use of alcohol."

ALCOHOL AND HEAT

When the true effect of alcohol became known to doctors they thought that alcohol might be useful in fevers to lower the temperature of the body, but it was found that the action of alcohol on other organs of the body was such that it was not wise to use it. The travelers in tropical countries have found that the only safe rule of health is to abstain from alcoholic liquors. Sir H. M. Stanley, the African explorer, said: "I attribute all the deaths among my men to reckless exposure in the sun, and the use of alcoholic drinks." General Gordon, Livingstone, Moffat, Bruce, and others, all bear testimony to the fact that alcohol is not a friend of the traveler in hot climates, but an enemy.

Sir W. McGregor, a former Governor of Queensland, who was also Governor of Newfoundland, and of New Guinea, said: "The drinking man cannot endure the cold so well as the total abstainer; just as the drinking man in the tropics cannot undergo heat and fatigue as well as the man that never tastes liquor."

ALCOHOL AND SKILLED WORK

Experiments prove that while men imagine that they are doing better work after taking intoxicating drink, the actual results show that the reverse is the case.

Professor Kraepelin, of Munich University, has made a great number of tests upon men. When the experiments commenced, the professor was sure that he would find that men work better under the influence of alcohol. It was, therefore, a matter of great surprise to him to find that while the drinker might start off work with a spurt, he would invariably lag behind the abstainer before the test was completed. Professor Kraepelin made exhaustive tests, but whatever the class of work the results were without exception in favour of total abstinence.

One of these experiments was tried with a contrivance which consisted of groups of fine lights all of a different colour. The operator would turn on one of the lights which at the same time started a clock. The person who is the subject of the experiment stands in front, and his duty is to press a key corresponding to the light shown; this will put out the light and stop the clock. The experiment shows the time that the man's brain has taken to receive the signal and give the response.

These experiments proved, to the professor's astonishment, that a man crossed the imaginary line between moderation and excess with the very first half glass of beer he took. Very small quantities confused the mind and made the drinker less quick in seeing and hearing, and judging, and less prompt in acting. Even the simple operations of adding up sums, or reading aloud, were found to be interfered with in this way.

ALCOHOL AND COURAGE

We often hear men who are under the influence of drink boasting about what they can do. Dr. Brown

tells the story of an amateur Alpine climber who took a nip of whiskey to give him courage to jump a dangerous crevasse. "After that," he exclaimed to a friend, "I jumped it like a bird." "Like a fool, rather," was his friend's comment.²² If his judgment had not been impaired, he would have known the danger he was running. Alcohol is responsible for many of the accidents that occur. When the brain is drugged the drinker imagines that he is able to do the impossible, and takes risks that he would never dream of taking in his sober senses. Alcohol does not give courage, but recklessness. Thus, the habit grows and becomes a great national curse.

ALCOHOL AND FATIGUE

Another instance of the deceptive powers of alcohol is that when a person is tired, and the little nerve cells are sending their warning message to the great commander, that the body is in need of rest, the person may take alcoholic liquor, and then, because he is no longer conscious of his tiredness, concludes that the drink has given him strength, but again he is deceived. For what has really happened is that once again the cells have been drugged, and though the body is just as tired, if not more so, for we know how alcohol increases the work of the heart, yet the person, because the warning is no longer heard, may neglect to take the needed rest and the body suffers in consequence.

ALCOHOL AND HUNGER

The false sense of well-being that alcohol gives is never more in evidence than in the case where a person feels hungry, and after a drink of alcoholic liquor congratulates himself that the body has now received the food it was asking for because he no longer feels hungry. It is just the same experience as we studied previously. The feeling of hunger has vanished because the cells are drugged, the

body still needs food but the call for it is not being felt on account of the influence of the alcohol.

THE LESSON APPLIED

The custom of taking as beverages drinks that contain alcohol has continued through the ages because alcohol has succeeded in cheating men and women into the belief that it is a friend of the human body. Even in these days, when the scientific proof of the harmful effects of alcohol is to be found on every hand, still millions of people are cheated. They do not take the trouble to find out the truth, and are content to go on in ignorance.

ILLUSTRATIONS

Alcohol cheats men into believing that they are more powerful as a result of the drug, when in reality they are losing their power gradually until they are abject slaves. The story is told of Alexander, son of Philip of Macedonia, and afterwards king. When Alexander was a boy he was noted for his fearlessness, courage and strength. History tells how, on one occasion when his father received the present of a beautiful warhorse, which no one could ride, the young prince asked for permission to try, and to everyone's astonishment, he mastered the spirited creature. During his reign he had immense armies; they fought against kings, and defeated them. He had great success, and it is said of him that he cried because there were no more lands to conquer, but in the end Alexander, himself, was conquered. Although his father had suffered because of his drinking habits, yet Alexander did not take warning, but gradually became a victim of the wine cup. On one occasion he had a feast, and offered a crown as a reward to the man who should drink the most. This was won by Promachus, who died three days after. Of the others, forty died of their intemperate drinking. Alexander, while under the influence of drink,

murdered his best friend, and he who had been such a great king and conqueror, was cheated out of his kingdom by a little white poison called Alcohol, and at the age of thirty-three years died defeated.

SUPERSTITION (SENIOR)

Thus we find that the chief reasons for the widespread use of alcohol are grounded in ignorance and superstition. People believe that it is useful and beneficial; that it nourishes and strengthens the body; that it produces energy for work. They believe that it assists them to bear fatigue, to resist exposure and to endure cold and damp. They believe that it dispels sickness, relieves hunger and soothes the stomach. All these beliefs are false.

We have learned that alcohol does none of these things, and that, on the contrary, in every case it does the exact opposite. Why, then, do people believe the opposite of the truth?

The answer lies in the action of alcohol on the brain. It is essentially a deceiver; it deadens and paralyzes the highest parts of the brain, so that a man under its influence is no longer a competent judge of his thoughts, feelings or actions. The following is part of a dictation which was given some time ago to ten thousand French girls at an examination in Paris:

"Alcohol is certainly a liar and a deceiver. It pretends to strengthen a man, and it makes him weak; it pretends to warm him, and it makes him cold; it pretends to make him rejoice, and it causes him to despair; it pretends to give life, and it brings death."²³

Questions:

- (1) Is alcohol useful to give heat to the body?
- (2) Why?
- (3) Do men work faster after taking alcohol?
- (4) What are some of the experiments that prove this?

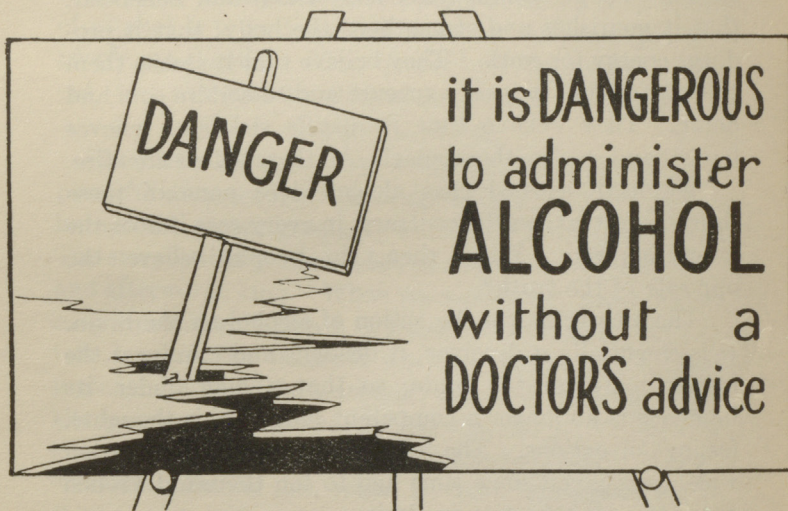
LESSON NO. 10

FIRST AID

TEACHERS' NOTES

CHART No. 10—"First Aid."

Blackboard.



Object Lesson—Give demonstration of first aid in fainting and restoring apparently drowned, sudden illness, etc.

Experiment—Place some medicated wine in a flask and apply heat; the liquid will soon boil, and the vapour may be ignited at the mouth of the flask. As the vapour of water will not burn, this experiment teaches that wine contains alcohol. When any substance contains more than forty per cent. alcohol its presence can be discovered by simply pouring a little on a plate and burning it.

Memory Line:

"Where there's drink, there's danger."

Scientific Thought—"It is a serious statement to make, but 'tis one I am thoroughly satisfied on, that in the old days a great many people died, when alcohol was given, who would otherwise have recovered."—Prof. Sir Sims Woodhead, M.A., M.D., F.R.S.

Aim—To show the mistakes people make in giving spirits as first aid remedies.

THE LESSON**ACCIDENT**

We learn from our study of the human body that alcohol is the enemy of life. Alcohol is a drug like chloroform or ether, and just as we would be afraid to administer such powerful drugs without a doctor's written prescription, stating size and frequency of dose, given after he has made an examination of the patient, so we should remember that it is just as dangerous to administer alcohol without a doctor's orders. Many people do not know what to do if a person is taken suddenly ill, and the only thing they can think of is spirits, such as brandy or whiskey, but this is a very dangerous practice. It is very possible that alcohol may make it more difficult for the patient to get better and may even make recovery impossible. In all accidents that cause bleeding, a dose of spirits would cause an increase in the flow of blood, adding to the danger and lessening the chance of recovery. Doctors tell us that in head troubles alcohol is very dangerous.

FAINTING

Dr. White, F.R.C.S., Ed., says, "Alcohol in the form of brandy is often unnecessarily given for faints. As an

officer of the St. John Ambulance Brigade, I have often been on duty amongst crowds, and I have never yet seen a faint that required alcohol; simple remedies, such as keeping the head low, raising the arms and loosening tight clothing, and perhaps sprinkling the face with cold water, are sufficient."²⁴

CHILL

Dr. Hawkyard, of Leeds, says: "In the treatment of an ordinary cold, alcohol is often given with a view to 'sweating it out.' When a person gets a chill, as it is popularly called, it is often extremely doubtful what illness may develop. Feverish symptoms are associated with the outset of most serious illnesses. It is not safe to treat these symptoms by means of alcohol." Dr. Hawkyard then goes on to explain how many illnesses are due to an enemy germ finding its way into the blood, and how the little white blood cells, or corpuscles (that we read about in a previous lesson)—whose duty it is to attack and destroy these invaders—increase and get to work. While the battle is raging between the enemy and our little white soldiers, the patient is ill and feverish; if the white cells conquer, the patient gets better. This, however, can only happen when the white cells are in good working order, and Dr. Hawkyard adds: "It is now a well-established fact that the effect of alcohol on the white blood cells is to stop their normal increase and paralyze those which are already there, so that alcohol is the worst possible thing to give to anyone suffering from symptoms of chill, which may develop into serious illness; it may destroy the only chance the patient has of recovery. After thirty years in the practice of medicine I am more than ever convinced of the fact that alcohol is not only useless in the treatment of illness, but positively dangerous."²⁵

ALCOHOL AND PAIN

The body is indeed a most marvellous machine, for it has the power, when anything gets out of order, of repairing itself. We learned how the white corpuscles destroy disease germs. There are hundreds of ways in which the cells of the body adjust themselves to keep the organs in a healthy condition. Very often, when a doctor is called in, the best service he can render is to aid the body in its own fight to get better, rather than prescribe a lot of medicines. When the body is suffering from an injury it usually sends a cry of pain to the great commander. Many people have still the old superstition regarding the use of alcohol in emergency: they conclude because they are not so conscious of the pain, after taking spirits, that the alcohol has cured the trouble. As we learnt in our last lesson, the brain is drugged. The trouble which caused the pain has not changed, but the warning bell has been silenced and the person is deceived.

MEDICATED WINES

Alcohol is found in various dresses, and one very dangerous deception is what is called "medicated wine." Often people take these so-called medicines, and do not know that they contain from five per cent. to twenty-five per cent. alcohol.

The Legend of Red Riding Hood and the wolf who pretended to be her grandmother in order that Red Riding Hood would think everything was perfectly safe, when in reality the old wolf was not her friend, but her enemy, is a good illustration of the way people are deceived by these much advertised medicated wines, which are responsible for the development of the alcohol habit in many people.

CONSUMPTION

It is the opinion of many scientists that consumption is a disease which ought to have been stamped out by now. Pasteur said, "It is in the power of man to make microbe diseases disappear from the surface of the globe." And many believe that if it were not for the habit of drinking liquors containing alcohol, this would have been accomplished. France is a great wine drinking country, and the doctors there realize that their high death rate from consumption is largely the result of this habit.

In a district where an average of twelve litres of wine is taken per person per year, the annual death rate from consumption is three per thousand; where it is thirty-five litres per person, the death rate is ten per thousand, the dread disease increasing in proportion to the amount of alcoholic liquor consumed by the people.

In the case of pneumonia, statistics in the *National Temperance Quarterly*, 1911, by Osler and McCrea, show that of the abstainers who contract the disease, 18.5 per cent. die; moderate drinkers, 25 per cent. die; intemperate people, 52.8 per cent. die (see Chart No. 10). This applies to many other diseases besides pneumonia. At a great International Congress on tuberculosis, held in Paris, and in the presence of three thousand scientists, a resolution was carried with great applause: "That in view of the close connection between alcoholism and tuberculosis, this congress strongly recommends that the fight against tuberculosis be combined with the fight against alcoholism."

THE LESSON APPLIED

The habit of administering alcohol in first aid cases is one of the customs that has helped to develop the alcoholic habit.

In the first place people get a wrong impression of the drug. It is given a place in the medicine chest, and is regarded as a friend.

Then people are very prone to give alcohol when they do not know what else to do, thinking that if it does not do any good it will not do any harm, but such is not the case, as we have learnt in the lesson to-day. It may do the patient irreparable harm.

In the third place people will often continue taking it as a medicine and many people who to-day are confirmed drunkards acquired the habit under the false impression that it was a medicine for the body. We should never take or administer alcoholic drinks unless a doctor has ordered them, which will be only on very rare occasions, as science is daily proving alcohol of less and less value as a medicine.

ILLUSTRATION

At a seaside resort on the Pacific coast members of the Life Saving Club were giving a demonstration; a large crowd of people were gathered to watch the display; a number of young men with strong muscles and the glow of health about them, arrived on the beach; one of their number then went out into the breakers, another with a life-belt attached to the life saving machine, followed; at a signal from the first swimmer, the second swimmer went to his assistance. After he had effected the rescue, the members of the club on the beach drew in the line, and the rescued and rescuer were brought to shore. The captain then proceeded to give a demonstration on how to resuscitate life in the apparently unconscious form. After the first efforts were over he turned to his audience and said: "When the patient is so far recovered, give him—" and someone interjected, "A drop of spirits," but the young athlete answered: "No! if you

value your patient's life, under no circumstances give him spirits, but give him sips of hot water or hot coffee." One could not help realizing that the majority of people there would have made the same old mistake and given spirits, perhaps working irreparable harm just because they were ignorant of first-aid principles.

DOCTORS AND ALCOHOL (SENIOR)

The progress science has made during the last half century is such that the true action of alcohol on the human system has been noted; this led to a great reduction in the use of alcohol as a medicine. While alcohol was regarded as a stimulant it was used for many diseases. Now that it is known to be a depressant drug, scientific men do not use it so frequently, though the popular idea of alcohol as a stimulant is still with us. Old superstitions cling to the people for many years after science has demonstrated their folly, and we must remember that modern scientific physiology, as we know it to-day, is only fifty years old. The facts that we have noted in previous lessons are comparatively new to the human race, and when they are well-known, the nations will regard alcohol in its true light. The day of knowledge is only in its morning, the dawn of which William Sharpey was conscious of when he said: "We seem to see in the progress of physiology not a few but many paths just opening before us, which must certainly, as it seems, lead quickly to new light, to fuller vision and to other paths beyond." Even the medical profession has but slowly realized the significance of the reversal of the old ideas regarding alcohol.

All over the world the amount of alcohol used as medicine is being reduced. In the United States there are 152,672 doctors; only twenty-two per cent., that is,

33,379, hold or have taken out licenses to prescribe alcohol.

Dr. Weeks says: "It emphasizes very strikingly the fact that three-fourths of the procession have come to the conclusion that alcohol is not a necessity in the treatment of disease." ²⁶

In Ontario, Canada, 525 doctors replied to the question: "Do you consider that, generally speaking, another therapeutic agent could be used which would be as effective as alcohol? Three hundred and seventy-six said, "Yes."

The late General Gorgas, the Panama Canal medical officer, said, as past President of the American Medical Association: "If I had the power I would not only blot out all alcoholic liquors from the pharmacopeia, but also from use anywhere else."

Dr. Mayo, whose clinic has such world-wide fame, said: "Alcohol is rarely employed now, being displaced by better remedies."

Thus the passing generations hand the torch of scientific knowledge to the young people of the present day to carry it forward, until its light shall guide not only scientists, but the common people, to a fuller knowledge of how to live, not only to avoid disease, but to get from life the very best it can give.

Questions:

- (1) How would you treat a person who had fainted?
- (2) Is it wise to give alcoholic drinks as a remedy in case of chill?
- (3) Why?

LESSON NO. 11

TOBACCO

TEACHERS' NOTES

CHART No. 11.

Blackboard.

A CIGARETTE'S ARITHMETIC

I am not much of a mathematician,
Said the cigarette, but I can and do
Add to a man's nervous troubles,
Subtract from his physical energy,
Multiply his aches and pains,
Divide his mental powers, take
Interest from his work, and
Discount his chances of success.

Object Lesson—Picture of athletes.

Dictation—"The relation of the tobacco habit to the character of school work was shown by H. R. Smith, Superintendent of Schools, Bloomington, Indiana, by a study of nine hundred and fifty pupils. He found that smokers were distinctly older than non-smokers, having failed in their work much more frequently; that smokers were doing distinctly poorer work than non-smokers; and that smokers were disciplined much more frequently and for more serious offences."²⁷

Memory Verse:

"When the fight begins within himself
A man's worth something."

—Browning.

Scientific Thought—"In all ages the man whose determinations are swayed by reference to the most distant ends, has been held to possess the highest intelligence."
—Prof. James in "Psychology."

Aim—To show that the use of tobacco is a habit that hinders the smoker from achieving his best, whether in the intellectual arena or the field of sport.

THE LESSON

In November, 1492, a party sent out by Columbus from the vessels of his first expedition to explore the Island of Cuba, brought back information that they had seen people who carried a lighted firebrand to kindle fire. As the continent of America was opened up and explored, it became evident that the consumption of tobacco, especially by smoking, was a universal and immemorial usage, in many cases bound up with the most significant and solemn tribal ceremonies; when the tobacco plant became known in England through Spain, the habit of smoking spread, a custom that was viewed with much alarm at first, as is instanced by the verdict of James I, who described it as "A custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and the black, stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless."

People gradually became accustomed to smoking, and so were less alarmed, but of later years many realize the un wisdom of forming habits which tend to handicap one in the battle of life.

NICOTINE

Tobacco contains nicotine, a powerful poison, and several other poisons of the same character. The percentage of nicotine varies according to the brand and

conditions under which it is cultivated. Nicotine, which resembles prussic acid in the rapidity of its action when a fatal dose is taken, is so deadly that one drop on the unbroken skin of a rabbit will produce death. Two drops on the tongue of a dog or cat will prove fatal. If it were not for the fact that much of the nicotine is destroyed in the process of smoking, smokers would soon die of poisoning, for "there is sometimes sufficient nicotine in an ordinary cigar to kill two men. (One to three milligrams have produced profound poisoning in man.)"²⁸

It is true, however, that the smoker absorbs some of the nicotine.

"Baumberger estimates the quantity of nicotine in smoke as fourteen to thirty-three per cent. of that present in the tobacco smoked. It is estimated that there are about five milligrams of nicotine in the puffed smoke of one cigarette, sixty-seven per cent. is absorbed if the smoke is merely taken into the mouth, and eighty-eight per cent. if it is inhaled into the lungs. Some may be lost in the saliva."²⁹

"A cigarette smoker who puffed away steadily for an hour might absorb as much as thirty-six milligrams of nicotine if he inhaled, and twenty-seven and one-half if he only puffed—an amount sufficient certainly to cause ill-effects."³⁰

DRUG EFFECT

It is evident that people smoke for its drug effect. The smoker talks of its "soothing" qualities, that is, its narcotic effect on the higher brain centres, as Victor Hugo says, "Under the influence of tobacco, thought becomes reverie." As in the case of alcohol, it supplies no natural need of the body, nature usually warns the individual, on the first occasion of smoking, by causing a sensation of sickness.

There is no doubt that habit plays a big part in the custom, but it is evident that the drug effect of the nicotine is the chief cause of the habit being so widespread, for nicotineless tobacco is not popular. Like any other habit it may lead to increasing indulgence and to enfeeblement of will-power.

TOBACCO AND SCHOLARSHIP

In a normal human being, the brain is developing for the first thirty years of life. Whatever may be said of smoking in later years, there is not the slightest doubt that its effect on youth and young manhood is disastrous. In this connection the observation of college professors is valuable.

Professor J. Pack, of the University of Utah, says: "Smoking is invariably associated with low scholarship," while Arthur D. Bush says: "Experience in a number of tests proved that there was a ten and one-half per cent. decrease in mental efficiency after smoking."

It is true that many notable scholars smoke. They achieve high scholarship in spite of this handicap, but no one can tell how much greater they might have been without it.

The only way to prove whether smoking injures the mental powers is to observe large numbers of students, and strike an average. For that purpose the following findings are of value. Dr. Seaver made a study of students over a period of years. He says: "Only about five per cent. of the high stand men at Yale University used tobacco." He also found that "the smokers who entered Yale averaged fifteen months older than the non-smokers."

Careful studies by Dean Howell, for two years, of men attending Ohio Wesleyan University, showed that

non-smokers succeeded in obtaining eighty-four per cent. of the high grades, while smokers obtained only sixteen per cent. of them.

"At Clark University, Professor Clark found that in three years about one and one-half times as many smokers as non-smokers dropped out of college, or took an extra year to finish, and that students who began smoking after entering college were ten per cent. lower in scholarship than those who remained non-smokers."

We sometimes hear of intellectual people who affirm that they do their best work under the influence of the "weed." "Those who fancy that their thoughts flow more readily under the use of tobacco are in the same situation as any other habitue whose thoughts cannot flow serenely except under his accustomed indulgence. That a sound, healthy man, who has never been accustomed to the use of tobacco, can do better mental or physical work with tobacco than without it has never been shown. Indeed, such experiments as have been made on students and others indicate the contrary."³¹

There is an anecdote to the effect that Sir W. Scott, when a boy, cut off the top button of another schoolboy's jacket with which he played while reciting. After the loss of the button he could not recite. The smoker is often in the same situation, accustomed to smoke while studying, he imagines he cannot concentrate his thoughts without the pipe or cigarette between his lips.

TOBACCO AND SPORT

In the field of sport tobacco users are severely tested, for here is the trial of strength, staying power, mental alertness and physical fitness generally. Professor Pack gives the following table, drawn up from the records of

six educational institutions, of students competing for places in the football team:³²

Institution	Number competing for places	Number Successful	Per cent. Successful
A.			
Smokers.....	11	2	18
Non-smokers.....	19	11	58
B.			
Smokers.....	10	4	40
Non-smokers.....	25	17	68
C.			
Smokers.....	28	7	25
Non-smokers.....	17	14	82
D.			
Smokers.....	28	11	39
Non-smokers.....	15	10	67
E.			
Smokers.....	10	7	70
Non-smokers.....	15	12	80
F.			
Smokers.....	6	0	0
Non-smokers.....	26	15	58

His conclusions were as follows:

"(1) Only half as many smokers as non-smokers are successful in the 'try-outs' for football squads.

"(2) In the case of able-bodied men smoking is associated with loss of lung capacity amounting to practically ten per cent."³³

Experiments reported by Fisher and Berry show conclusions as follows: "Smoking causes loss in physical precision, and loss in accuracy of pitching a baseball."

"(a) All smokers and habitual non-smokers showed a loss in physical precision immediately after smoking.

"(b) Smoking reduces accuracy in pitching a baseball.

"(c) In tests where there was no smoking all the men improved in accuracy of pitching." Connie Mack, the famous baseball hero, made it a rule not to sign up baseball league men who smoked. Clark Griffiths, as manager of

the Washington Nationals, said that "any player who insists on smoking cigarettes is through." The fact that most conscientious athletes do not smoke when "in training" shows that they realize that tobacco is injurious.

TOBACCO AND HEALTH

"(a) It has been proved beyond doubt that the normal heart rate of smokers is higher than that of non-smokers.

"(b) Smoking causes a delay in the return of heart-rate to normal after excess.

"(c) The heart-rate was increased in sixty-three per cent. of the smoking tests. The average heart-rate at the end of fifteen minutes after smoking was eleven and one-fifth beats greater than the average normal heart-rate." ³⁴

There is an old saying that a man is just as old as his arteries.

"In experiments on animals, nicotine extract from tobacco and inhalation of tobacco smoke have produced hardening of the large arteries. Other experiments have shown in smokers 'a disturbance of blood-pressure, rapid heart action, shortness of breath, palpitation of the heart, pain in the region of the heart.' 'There is also often an irritant reaction on the mucous membranes of the eyes from the direct effect of the smoke. Acid dyspepsia is a common affection among smokers and 'Excessive smoking is often an important factor in causing insomnia.' " ³⁵

THE LESSON APPLIED

TOBACCO AND THE OTHER PEOPLE

Tobacco users often fail to realize the discomfort they cause to other people. Very few people will admit that they dislike smoking, for they would be sensitive about

interfering with what might be another person's pleasure, so the majority of people endure the annoyance as cheerfully as possible. But it *is* an annoyance. If several people are smoking in a room the air will often be heavy enough to cause headache.

"In an unventilated room ten feet square and ten feet high, occupied by ten men, all smoking cigarettes steadily for an hour, the air would contain about two parts of carbon monoxide in ten thousand parts of air, and enough nicotine to furnish two and three-fifths milligrams of nicotine an hour to a person compelled to breathe it. Sufficient concentration to cause headache due to the increased pressure on the brain, produced both by the nicotine and the decreased oxygen in the blood."³⁶

As a rule people are seldom forced to breathe an atmosphere as bad as that, but it is a common experience to come out of a building where people have been smoking, with a dull heavy feeling, and one's clothes reeking of tobacco fumes. When we realize that this custom is merely an acquired habit, it makes us ask, "Why does each generation learn to smoke? Why not the new generation resolve to change the custom?" One reason is the enormous amount of money spent on advertising different brands of tobacco and cigarettes by the tobacco trust. Also, by force of example. Some boys get an idea that smoking is a proof of manliness, when in truth it takes more of the qualities of true manliness to stand out against a popular custom. A boy who needs a cigarette to help him attest his manliness is sadly lacking in all that makes for true value. A refusal to smoke is not an example of priggishness, but the proof of a sane outlook on life, first-class self-control and a sense of true values.

The late Mr. Burbank, so well-known to lovers of horticulture, said, regarding tobacco: "The truth will

never be realized about tobacco as long as great companies are able to spend millions of dollars to entice people to use it." He states: "Bill-board advertising, newspaper advertising, and magazine advertising search every nook and cranny of the country for victims. There is no escape for each new generation as it comes along. No matter where a boy may be, tobacco advertising reaches him and pleads with him to be a fool to injure his health, decrease his happiness and shorten his life, that the tobacco interests may gather more millions."

Also there is the tremendous loss of property through fires. It is estimated in the United States that at least ten per cent. of the fires are caused through smoking. Probably the percentage is higher, but at that figure this custom costs the United States forty million dollars in fires alone. That is only the cost in money, there is also a heavy cost in lives.

HABIT (SENIOR)

There is a difference between a habit and a craving, but it is difficult to say where one merges into the other. There is no doubt that nicotine creates a craving for itself. This is evident in the struggle people have when they desire to give up the use of tobacco. If, however, its drug effect were negligible, it is surely wisdom to avoid contracting any habit that is likely to prove a handicap.

We are all creatures of habit. Professor James says: "Habit is the enormous fly-wheel of society, its most precious conservative agent. . . . At thirty the character has set like plaster. The period below twenty is more important still for the fixing of personal habits. The great thing then, in all education, is to make our nervous system our ally instead of our enemy."³⁷

EXERCISE OF WILL

It is of very great value to our character to fight something in our youth. If we are but echoes of the people around us, we will fail to develop those faculties that are an indication of a strong character. To quote Professor James again: "There is reason to suppose that if we often flinch from making an effort, before we know it the effort-making capacity will be gone." His advice is "keep the faculty of effort alive in you by a little gratuitous exercise every day, so that if the hour of dire need does draw near it may find you not unnerved and untrained to stand the test." "Could the young but realize how soon they will become mere walking bundles of habits they would give more heed to their conduct while in the plastic stage."³⁸

The custom of smoking by many of those with whom we come in contact, may be used by us as an opportunity to exercise this faculty of self-determination. It is easy to do as others do, but as life is made up of countless situations, wherein we have to make a choice, and because character is very largely the outcome of the decisions we make, the refusal to smoke will mean more to us than freedom from a bad habit. It will have provided us with a testing-place to exercise the moral fibre of our nature, and future tests will not find us "unnerved and untrained" when we meet other popular customs that are not in line with our highest judgment.

SMOKING AND DRINKING

It is true that the majority of those who use alcohol as a beverage, also smoke, while it is possible that the drug effect which users of tobacco get from the narcotic influence of nicotine, may create in them a desire for a stronger drug, such as alcohol. It is also probable that

if the youth has failed to stand true to his own judgment regarding smoking, he will be more likely to be vanquished in the later fight, when his companions will try and persuade him that he must attest his manhood by subscribing to the custom of using alcohol as a beverage.

If he "flinches" from the effort to stand out against one custom the "effort-making capacity" will be weakened, so victory elsewhere is made more difficult.

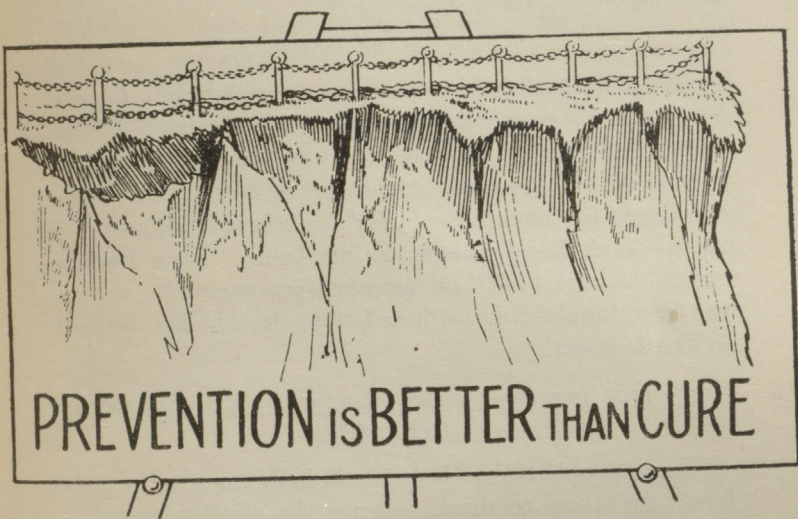
The suggestion to smoke offers to the young man an opportunity for that "little gratuitous exercise" which is a far greater proof of manhood endowed with its best qualities of self-control and sane judgment, than subscribing to any custom, because it is a custom, especially when the price is a mortgage on his most valuable gifts. To use these opportunities for self-training will give him something worth while. "The power of judging in all classes of matter will have built itself up with him as a possession that will never pass away."³⁹

LESSON NO. 12

CHARACTER

CHART No. 12—"Character."

Blackboard.



Object Lesson—The picture of an outstanding leader whose life illustrates good citizenship.

Experiment—Hold a cold white plate in a candle of flame, or an ordinary gas jet. There will be a rich deposit of soot. But on holding the clean plate in an alcoholic flame there is no deposit of soot. This shows how valuable alcohol can be when used in the laboratory. Alcohol burns with a pale blue flame, making little light but great heat.

Memory Verse—

"A time like this demands strong minds,
Great hearts, true faith, and ready hands."

Scientific Thought—"Character is a completely fashioned will."—J. S. Mill.

Aim—To teach how alcohol injures character, and that it is our duty to help establish a nobler, healthier, and happier nation.

SOCIAL CUSTOM

Why do people drink intoxicating liquor? Chiefly because it is a social custom. The great majority of those who drink, do so because it is the custom and their friends so indulge; they do not crave for it; there is no craving in the natural body for alcohol; it is an acquired taste. Jack London tells, in his book, "John Barley-corn," that it took him twenty-eight years to acquire the taste for alcohol, but long before that, he had learned to like its effect.

DOES THE TEMPTATION TO DRINK HELP MEN TO BE STRONG?

Some people think that it is best for men to have to face temptation to drink because the effort to resist it helps them to be strong.

We fight temptation by our force of will-power, by our control over our desires and by bringing our judgment into play to decide whether a thing is right or wrong, but alcohol paralyses that part of the brain where our decisions are made, and a man will fall a victim to a hundred sins when so drugged which he would conquer in his sober senses. Thus we find that drink is not a temptation in the sense that other things are, such as gambling, falsehood, impurity, and other evils, but it

makes failure and defeat in all these temptations easy for thousands of people, who, in their sober senses, would see the pitfall, and by using their normal will-power and judgment, turn away from such forms of evil.

THE BATTLE BETWEEN GOOD AND EVIL

From the time that we are old enough to choose between good and evil, we are conscious of two natures within us. One that wants to swim with the tide, that dislikes the constant battle against evil; this is the baser nature. The other is what we sometimes call conscience. When we are tempted to do wrong it is as though a voice in the brain whispered "don't." When we obey the whisper of our conscience, it often means a battle; it means that we must swim against the tide. But it is in this way that character is made. No man or woman worth while ever reached his high position by obeying the call of his baser desires, but by listening to that persistent voice of conscience and even at the point of great sacrifice, obeying its admonition.

ALCOHOL AND HABIT

When even a moderate dose of alcohol is taken into the body it goes on its way unchanged, by means of the blood stream, to the brain. Those higher powers of the mind are unable to exercise their true functions. The experiences of a lifetime are blurred, the latest acquired gifts suffering first. Power of judgment is disorganized, wrong does not look so wrong. The individual is not up to usual standard. The greater the amount of alcohol present, the greater the loss, until the person is reduced in intelligence to that of a feeble-minded person for the time being. The primal passions are released from control, and the powers that are valued most by the

individual and the race are drugged. It is true that the body gradually gets rid of the poison by excretion and by oxidation, but it is well to remember that if we sow seeds of a habit that poisons the delicate nerve cells of the body we must expect to reap the harvest.

Professor James says: "We are spinning our own fates, good or evil, never to be undone, every stroke of virtue or of vice leaves its never so little scar. The drunken Rip Van Winkle, in Jefferson's play, excuses himself for every fresh dereliction by saying: "I won't count this time." Well, he may not count it and a kind heaven may not count it; but it is being counted none the less. Down among his nerve cells and fibres the molecules are counting it, registering and storing it up to be used against him when the next temptation comes."⁴⁰

ALCOHOL AND MODERN LIFE

In the days when the great mass of the people did not have to think for themselves, but were serfs ruled by overlords, the evil results from the custom of using alcohol would not be so noticeable. Men travelled behind animals and even if the driver was under the influence of the drug, he would arrive home safely, because the horse, at least, was sober. But with the advance of science during the last century, life has become a different thing; trains travel at terrific speed and a wrong signal or a wrong interpretation of the signal hurls hundreds of people to their death. Our city streets are filled with hurrying human beings; traffic laws are constantly requiring more and more prohibitions in the interests of public safety, and a driver whose brain is confused with alcohol is a menace to public safety.

In those days very few people carried national responsibility, but now that we are a democratic nation, people must consider great public questions and bring

their judgment to bear on the nation's affairs, it is necessary for them to have their brain at its best, if their decisions are to be worthy of the high ideal of democracy.

Every nation is seeking a high standard of life. A nation's greatness is not only in her natural resources. A nation's greatest asset is her men and women and her youth. The standard of her people is the standard of the nation and anything that lowers the standard outlaws itself and must sooner or later be regarded as the enemy of the race.

Disease is defeat. Health is victory, and the person who uses as a beverage a drug that predisposes him to disease may become a national liability and a hindrance to progress.

ALCOHOL AND THE RACE

The worst effect of alcohol, however, is its influence on the next generation. Many of the children of drinking parents are born weak mentally, physically, and spiritually. They are handicapped right from their birth, through no fault of their own.

The following is an illustration of this:

In 1901 Dr. MacNicholl studied mental efficiency of school children for the New York Academy of Medicine, examining fifty-five thousand children; of these, the alcoholic habit with regard to the parents of twenty thousand was ascertained. Of six thousand, six hundred and twenty-four with parents who drank, fifty-three per cent. were dullards, while of those with abstaining parents only ten per cent. were so. The family history of three thousand, seven hundred and eleven for three generations was obtained.

(1) Of those free from alcoholic taint, ninety-six per cent. were proficient, four per cent. dullards, eighteen per cent. had some neurosis or organic disease.

(2) Those of hereditary taint, twenty-three per cent. only proficient, seventy-seven per cent. were dullards (one-third very deficient), seventy-six per cent. had some neurosis or organic disease.

THE LESSON APPLIED

Alcohol is, therefore, a created craving, which is the result mainly of a social custom. The following helps us to understand this. Two hundred and fifty-nine alcoholic patients at Bellvue Hospital, U.S.A., were examined as to when, and why, they commenced to drink: sixty-eight per cent. began to drink before they were twenty-one years of age, and thirty-two per cent. began through the social glass.

Also alcohol silences the warning voice that tells us when we are doing wrong. Like the story of Ralph the Rover, and the Bell on the Inchcape Rock—tradition says that the bell was wickedly cut away by the pirate, and that a year after, he himself, perished on that rock. Alcohol silences the warning bell of conscience, and men and women often make a wreck of their lives when under its influence. Our conclusions, after a study of what science says regarding this drug, is that alcohol is the enemy of our physical body, destroying health; it is the enemy of the mind, because it poisons the brain, and in this way, also destroys character.

ILLUSTRATIONS

The drink crave is one that is easy to acquire but difficult to escape. It is something like the legend of Sinbad and the old man of the sea. Sinbad lands on a pleasant island. While walking about there, he meets a very old man, who asks him if he will be so kind as to help him a little on his journey. Sinbad stoops down,

picks him up, and sets him on his shoulders. By and by, he begins to be tired and wants the old man to get down, but he refuses. After a little while he asks him again to get off, but still he refuses. Then Sinbad tries to shake him off, but he cannot. The man clings on as if for life. So poor Sinbad has to journey on and on with this load upon his shoulders.

Alcohol strengthens the baser instincts of the drinker and weakens the nobler impulses.

Robert Louis Stevenson's book, "Dr. Jekyll and Mr. Hyde," is not a happy story, but it is a terribly true one. Dr. Jekyll is pictured as a kind, self-sacrificing doctor, who does many good deeds and cares for the poor who have no money to pay for a doctor's advice. But Dr. Jekyll is conscious of another self that desires to do evil. The greater power, however, is with the better nature which triumphs over the evil. The time comes, when the doctor discovers a drug which has the power to paralyse the better nature, after taking this, Dr. Jekyll changes and becomes a man of evil whom he calls Mr. Hyde. While separated from his better nature he commits many evil deeds. Then he once more takes the drug, and becomes the kindly doctor. This goes on for years, but the time comes when Mr. Hyde becomes the stronger nature, and even when Dr. Jekyll fights against it, he is compelled to change to the hateful character of evil known as Mr. Hyde.

The battle at last is won by Mr. Hyde. Dr. Jekyll has lost his power, and the one-time kindly doctor is changed for all time into the evil character. So he dies.

Alcohol is a drug that has power to work this change in a greater or lesser degree. We can see at any time, men who have lost all power to live up to their early manner of life, whose evil nature has triumphed, and who

are cast out by society—men who might have been good citizens taking their place in the world of affairs to help humanity on towards a higher level. The loss is greater than any man can calculate.

SELF CONTROL (SENIOR)

The remedy then seems to be, to change our rules of society which make it customary to take alcoholic drinks as a beverage and offer them to others. This custom is one that has been handed down to us from ancient days, before science had discovered the fact that alcohol is a narcotic drug. In those days people judged this kind of beverage by the effect it had on the individual. These effects we studied in lesson number ten. After taking such drinks, men felt warmer, consciousness of fatigue and weariness vanished, the tongue was loosened, and they experienced a feeling of increased importance. Hence their belief in it as a gift of the gods. Wine was used in their forms of worship, and in various important ceremonies. They offered it to friends as an expression of hospitality and friendship, because they considered it one of the best of gifts.

The findings of science during later years have proved that alcohol is a poison. As knowledge of the laws that govern the human body and brain increase, arguments against its use as a beverage are strengthened. The most precious possessions of the race are clear brains and healthy bodies, with a chance to develop the highest gifts of nature which form character.

The advance of science during the last half century now places within our reach knowledge regarding the effects of alcohol which enables us to regard this antiquated custom with common sense. In the light of this

knowledge, it seems the essence of absurdity to drink to a person's health in that which is now proved to be the greatest friend of disease—to wish happiness in that which is the most fruitful cause of sorrow in the world—to express friendship and sociability in that which is the enemy of our friends' highest gifts.

"Self-control is one of the highest functions of the human being, therefore, the individual practice of self-control cannot be estimated too highly. We train children as far as possible to control their emotions and their actions, in the hope that ultimately they may become worthy members of the community. But "the effect of alcohol, in diminishing and breaking down this acquired self-control, may be seen in every condition of social life, undoing the work of all educationalists and parents. By deadening the brain cells wherein are registered the ideals on which we depend for calmness of judgment, alcohol causes serious lapses of self-control in many people, especially in young adults. Quite small doses are often responsible for the commission of reckless, self-pleasing actions and for the inordinate sway of the passions, which are no longer kept in full control by the higher powers of the mind, because these are more or less in abeyance as the result of the paralyzing effect of the drug. When the effect of the alcohol has passed away and the higher nature again asserts itself, the consequences of such actions have to be faced and these are frequently so far-reaching in their effect as to mar the moral and physical trend of many lives."⁴¹

For the human family the use of alcohol as a beverage tends to the substitution of a wishbone for a backbone.

Young people should make up their minds that they will not touch any alcoholic drinks as beverages, until they are thirty years of age. By that time the brain will

be developed, and they will probably decide to do without it for the remainder of their life.

Questions:

- (1) Why do men take intoxicating drink?
- (2) Does the custom of drinking alcohol as a beverage interfere with character building?
- (3) Why?
- (4) Why is loss of self-control one of the results of using alcohol as a beverage?

Notes for Sunday School Workers

LESSON NO. 1

WATER

Bible reference to water as a drink. Genesis, Chapter 21, verse 19: "And God opened her eyes and she saw a well of water; and she went out and filled the bottle with water, and gave the lad a drink." Hagar, when careworn and weary, is directed to a spring of water.

Exodus, Chapter 17, verse 6: "Behold I will stand before thee upon the rock in Horeb; and thou shalt smite the rock, and there shall come water out of it that the people may drink." When the children of Israel needed drink in the wilderness, water was provided from the rock. 1 Kings, Chapter 19, verses 5, 6: "And as he lay and slept under a juniper tree, behold then an angel touched him, and said unto him Arise and eat. And he looked, and behold there was a cake baken on the coals and a cruse of water at his head, and he did eat and drink and laid him down again"—when Elijah was cast down and weary, food and water were provided for his refreshment. John, Chapter 4, verse 7—Jesus said to the woman of Samaria at the well, "Give me to drink."

Our lesson to-day tells us that water is nature's drink, and because it is required by everyone, God has provided it in plentiful supplies. The above illustrations show us how God sent it to His servants by special means when they were in need.

LESSON NO. 2**GRAPES TO WINE**

The Bible refers to both unfermented grape-juice and fermented grape-juice as "wine." Proverbs, Chapter 23, verse 31: "Look not thou upon the wine when it is red, when it giveth its colour in the cup, when it moveth itself aright," clearly refers to alcoholic wine; such passages are warnings. Genesis, Chapter 40, verse 11, speaks of drinking the pure grape-juice: "And Pharaoh's cup was in my hand: and I took the grapes, and pressed them into Pharaoh's cup, and I gave the cup into Pharaoh's hand."

There are many people who quote the incident connected with the marriage at Cana as proof that Jesus regarded fermented wine as good for the people. In the first place we have no proof that the wine made on that occasion was fermented. And many believe that it is much more likely that Jesus repeated the miracle that nature works every year, when the grape vine produces the luscious grape from the water which it draws through its roots.

It is also wise to remember that strong drink as we know it to-day was unknown then. The Jews knew the art of fermentation, but they did not know that of distillation. Also there was no drink trade with its world-wide ramifications, which by widespread advertising and political influence seeks to prevent the people from throwing off this custom.

LESSON NO. 3**BARLEY TO BEER**

The first pledge against strong drink by direct command from God is recorded in Numbers, Chapter 6, verse 3: "He shall separate himself from wine and strong

drink, and shall drink no vinegar of wine or vinegar of strong drink, neither shall he drink any liquor of grapes, nor eat moist grapes or dried."

The command was given to those who desired to separate themselves unto the Lord. They were called Nazarites;—clear of complexion, and having health and vigour. The best known of the Nazarites are Samson, Samuel and John the Baptist. Jeremiah, Chapter 35, tells how the Rechabites kept their pledge and how God was well pleased with them for it. In verse 19, we read the promise that "Jonadab, the son of Rechab, shall not lack a man to stand before Me for ever."

Repeat together memory verse from Lesson No. 9.

LESSON NO. 4

ALCOHOL

Romans, Chapter 14, verse 21: "It is good neither to eat flesh nor to drink wine, nor anything whereby thy brother stumbleth or is offended, or is made weak."

St. Paul does not speak of the harm that wine may do to us, but he bids us abstain because wine hurts someone else, and by our example show that person a better way. Our lesson to-day points out that alcohol is a poison; therefore, it is our duty to abstain from the use of all alcoholic drinks, and also to tell others how harmful they are.

LESSON NO. 5

FOOD

1 Kings, Chapter 17, verse 6: "And the ravens brought him bread and flesh in the morning, and bread and flesh in the evening and he drank of the brook"—the story of Elijah fed by ravens. The bread and flesh provided each morning and evening and water from the brook.

Exodus, Chapter 16, verse 15: "This is the bread which the Lord hath given you to eat"—the manna provided in the wilderness fresh every morning.

The children of Israel gathered the manna fresh every morning, and it was good, but some disobeyed God, and kept a supply until the next day, when they found that it had decayed; yet when the Sabbath came they found that the food gathered on the previous day was good and wholesome.

Fresh, wholesome food is God's provision for the body's needs. Alcohol is nowhere found in good, fresh, wholesome foods, but only in that which has been allowed to decay.

1 Corinthians, Chapter 8, verse 13: "Wherefore, if meat make my brother to offend I will eat no flesh while the world standeth lest I make my brother to offend."

LESSON NO. 6

THE DEFENDERS

Luke, Chapter 10, verses 30-37, tells the story of the good Samaritan. A man had been robbed and hurt by the wayside. A priest and a Levite passed the wounded man by, and did not help him, but the Samaritan did all he could to assist the man. That was a long time ago, and men and women to-day are not robbed by the wayside like that man in our Bible story, but there are different kinds of robbers, and to-day's lesson tells us of alcohol, which robs a man of his health and strength, and leaves him sick and hurt. Some people act as if they do not care, but we must be like the man that Jesus told about, who had compassion on the sick man. We can help also to drive from our midst the robber, alcohol, who is responsible for so much sickness, sorrow and sin, when taken as a beverage, and so make our land safe for others.

LESSON NO. 7

THE LINES OF COMMUNICATION

1 Corinthians, Chapter 6, verse 19: "Know ye not that your body is the temple of the Holy Ghost?"

Explain the beauty and wonder of the earthly temple—how it (the body) is able, under normal conditions, to keep itself in repair for a hundred years; the natural defences of the body against disease; the senses that permit us to taste, see, hear, feel, smell. These are instruments of wonderful power, through which every joy and all happiness comes.

The lesson helps us to realize something of the wonders of this glorious temple that is our habitation during our earthly life. Also we must learn never to allow anything to enter the temple that will defile it. Alcohol is one of the worst enemies, because it opens the door to many other evil things. If we want to keep our temple pure, we must abstain from the use of alcohol, and if we want to help men and women to be better, we must work to remove the temptation to drink by prohibiting the sale of all drinks that contain alcohol for beverage purposes.

THE LIVING TEMPLE

O, Father! grant Thy love divine,
To make these mystic temples Thine,
When wasting age and wearying strife
Have sapped the leaning walls of life.
When darkness gathers over all,
And the last tottering pillars fall,
Take the poor dust Thy mercy warms,
And mould it into heavenly forms.

—O. W. Holmes.

LESSON NO. 8

THE GREAT COMMANDER

Genesis, Chapter 1, verse 27: "So God created man in His own image, in the image of God created He him."

Nothing destroys the image of God in a man so quickly as sin, and alcohol makes sin fascinating and easy.

The qualities that make men and women Godlike are those found in No. 5 development.

We learnt in our lesson that these qualities are the first to be degraded and destroyed through alcohol. We want it to be possible for every boy and girl to grow more and more into the image of God.

The following is the prayer Cardinal Manning puts into the lips of a little child:

"I promise Thee, sweet Lord,
That I will never cloud the light
Which shines from Thee within my soul,
And makes my reason bright;
Nor ever will I lose the power
To serve Thee by my will,
Which Thou hast set within my heart,
Thy precepts to fulfil.

"Oh, let me drink as Adam drank,
Before from Thee he fell;
Oh, let me drink as Thou, dear Lord,
When faint by Sychar's well;
That from my childhood, pure from sin,
Of drink and drunken strife,
By the clear fountains I may rest,
Of everlasting life."

The image of God is the power to decide between right and wrong, and choose the right. It is the will-

power under the guidance of a Christlike mind. Alcohol clouds the vision, so that we do not desire the highest gifts.

LESSON NO. 9

THE GREAT DECEIVER

1 Kings, Chapter 20, verse 16, tells the story of Benhadad, the king of Damascus, which city was supreme in Syria. Benhadad sent a message to Ahab, demanding his silver and gold, also his wives and children. Ahab was afraid to refuse; then Benhadad increased his demand. Ahab called the people together to consider the matter and they decided to refuse the demand. Benhadad was angry, and boasted what he would do to Israel. A messenger was sent back with this reply: "Let him not that girdeth on his harness, boast himself as he that putteth it off." When Benhadad received the message he was drinking with the other thirty-two kings in the pavilions. God sent a message by His prophet to Ahab, saying He would deliver His people. Ahab said: "By whom?" and the prophet replied: "By the young men of the princes of the provinces." Verse 16 says that when they went out, "Benhadad was drinking himself drunk in the pavilion." The result was a tremendous victory for the children of Israel.

The story teaches us two lessons. One is that the king lost his power, not on the field of battle, but when he drugged his brain with alcohol. The second is that the young men saved the position for the hosts of the Lord.

LESSON NO. 10

FIRST AID

Daniel, Chapter 1, verses 8-16. Daniel and his companions, though only boys, decided to stand firmly against

the temptation to take of the food and wine as served at the king's table, and begged for simple food and water instead. Melzar was afraid to change the diet that had been ordered them, for fear that they would suffer in health; Daniel was so sure of the result that he asked for a test of ten days. This was granted them, and at the end of the time, "Their countenances appeared fairer and fatter in flesh than all the children which did eat of the portion of the king's meat." Thus we find away back in those early days, as we have found ever since, with increasing testimony, that, when the test is made between alcohol and water, alcohol never, never, comes out victorious, as a friend of the human body. How did Daniel know that the ten days' test would prove to Melzar that they were better with the simple food? We do not know, we can only marvel that all those years ago he should know what science has only revealed of later years.

LESSON NO. 11

TOBACCO

Daniel, Chapter 3, verse 16: "Be it known unto thee, O King, we will not serve thy gods nor worship the golden image which thou hast set up."

The story of the three Hebrews is one that illustrates the need for courage to stand out against popular custom.

They knew that God was able to deliver them from the consequences of their refusal to worship the golden calf, but even if they were allowed to suffer death for their bold stand for right, still would they refuse to bow to the popular demand, but would rather die than surrender.

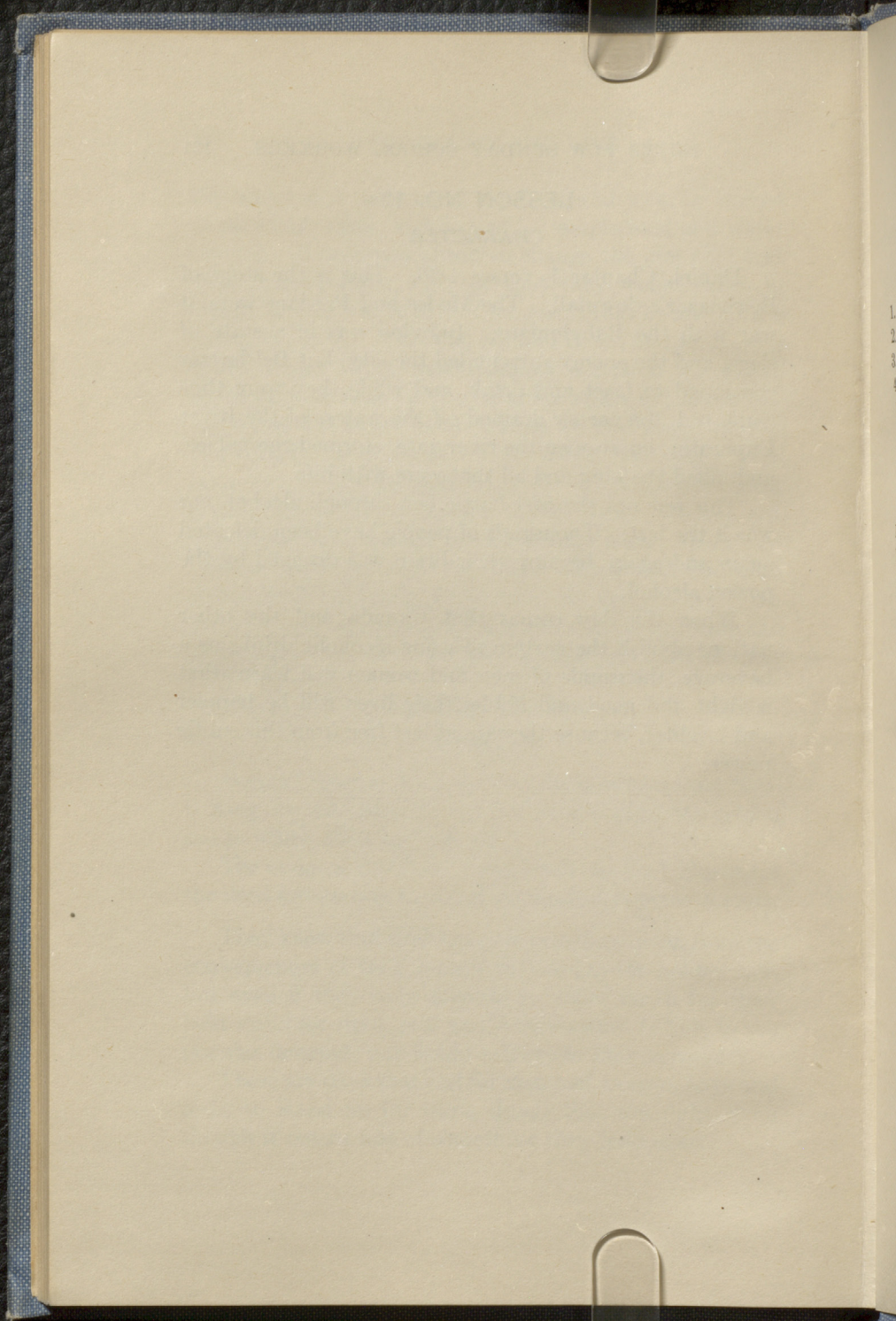
These are days that call for men and women, boys and girls, to stand up for those things that are right, even though it means loss of something they hold dear.

LESSON NO. 12**CHARACTER**

Daniel, Chapter 5, verses 1-30. This is the story of Belshazzar's downfall. The Medes and Persians were at war with the Babylonians. Babylon was in a state of siege, and the enemy surrounded the city, but Belshazzar continued to feast and drink, and while they were thus employed, the enemy drained off the waters of the River Euphrates, burst open the river gate, stormed the palace, and killed the king and all that were with him.

This was not the first battle lost through alcohol, nor was it the last. Thousands of people have been defeated again and again, because their brain was drugged by the poison alcohol.

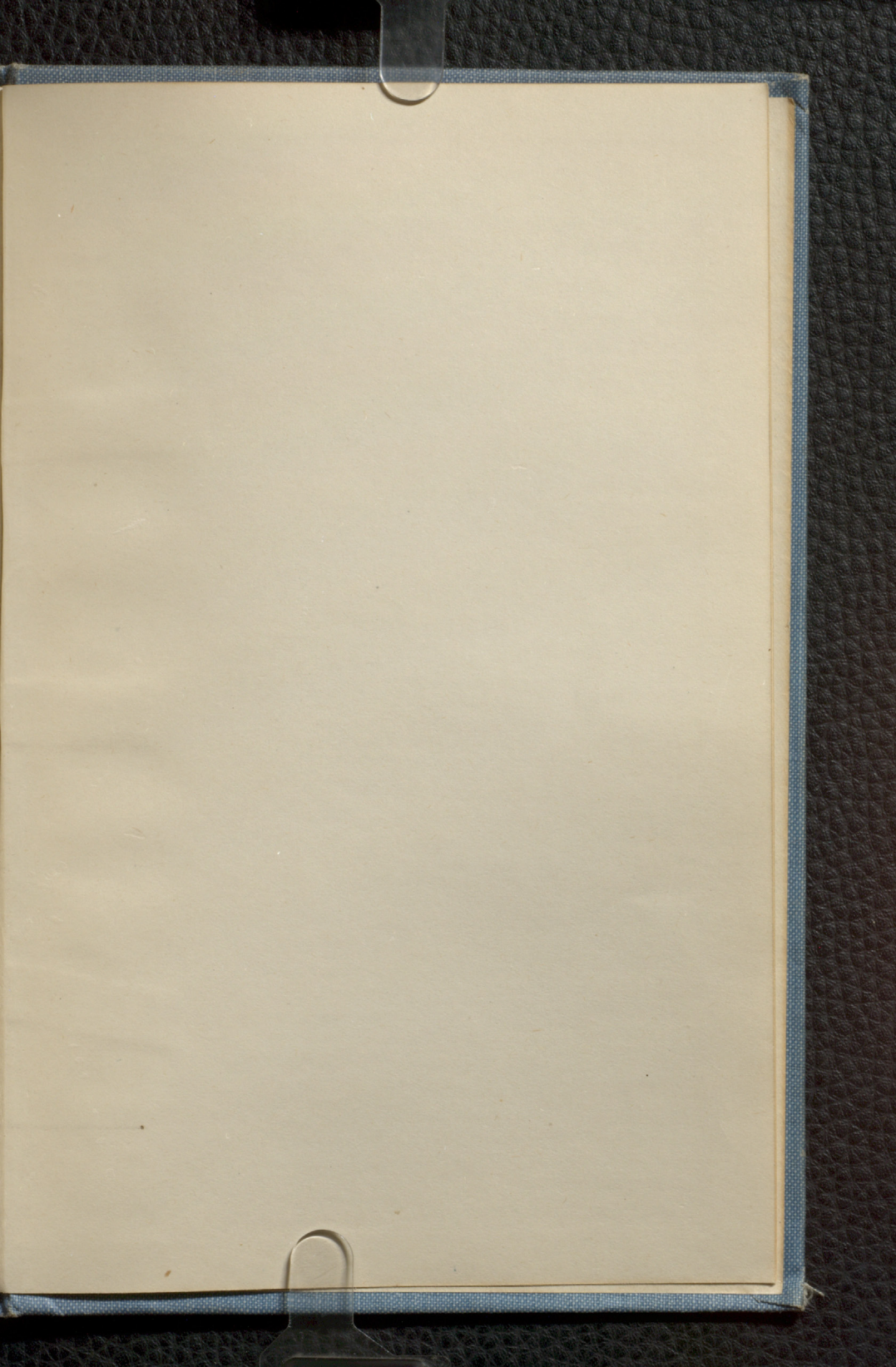
When the day comes that Canada and the other nations abolish the custom of using alcoholic drinks as a beverage, thousands of men and women will learn what is right and good and noble, their lives will be happier and brighter, because they are at last free from this subtle power.

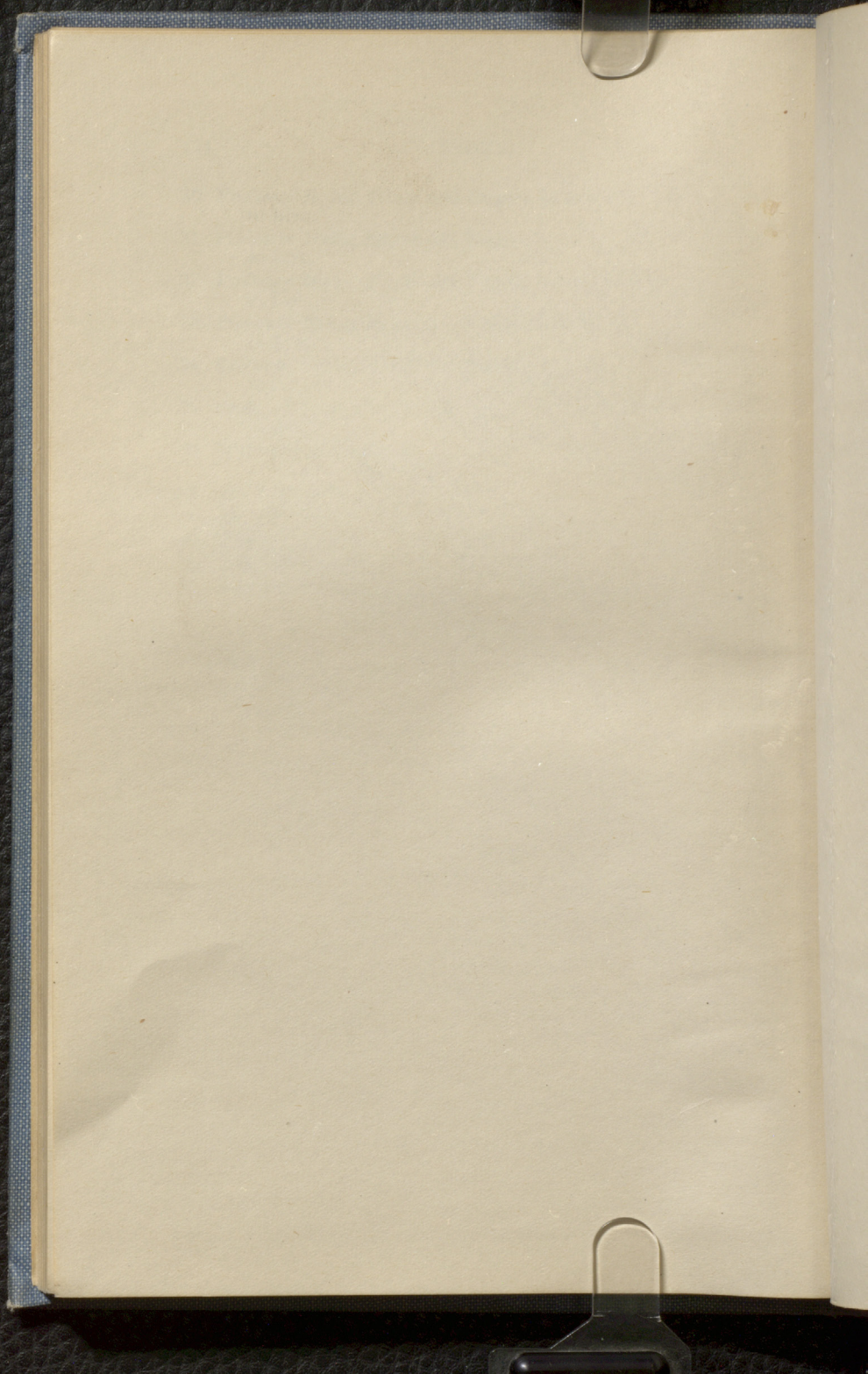


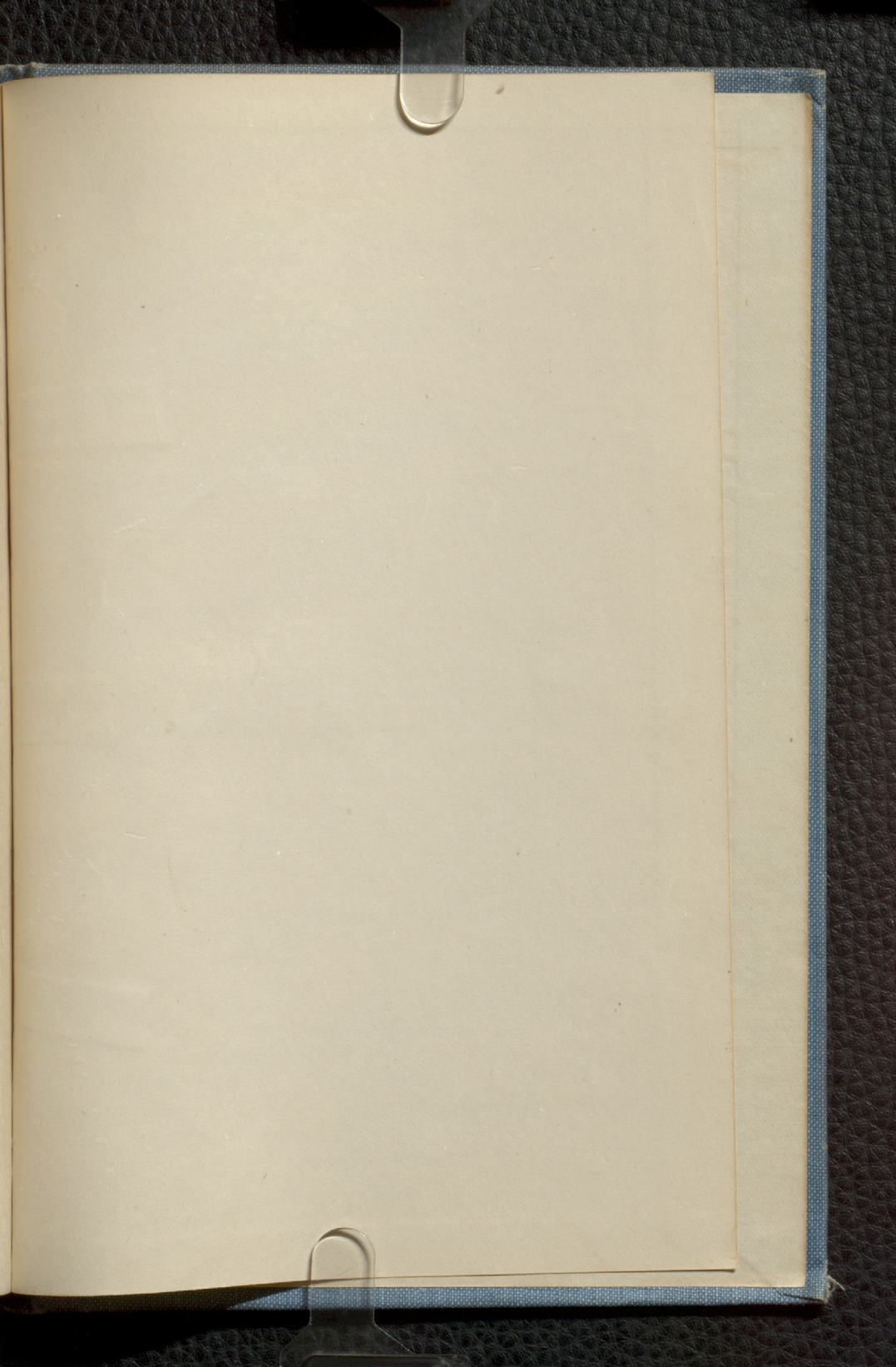
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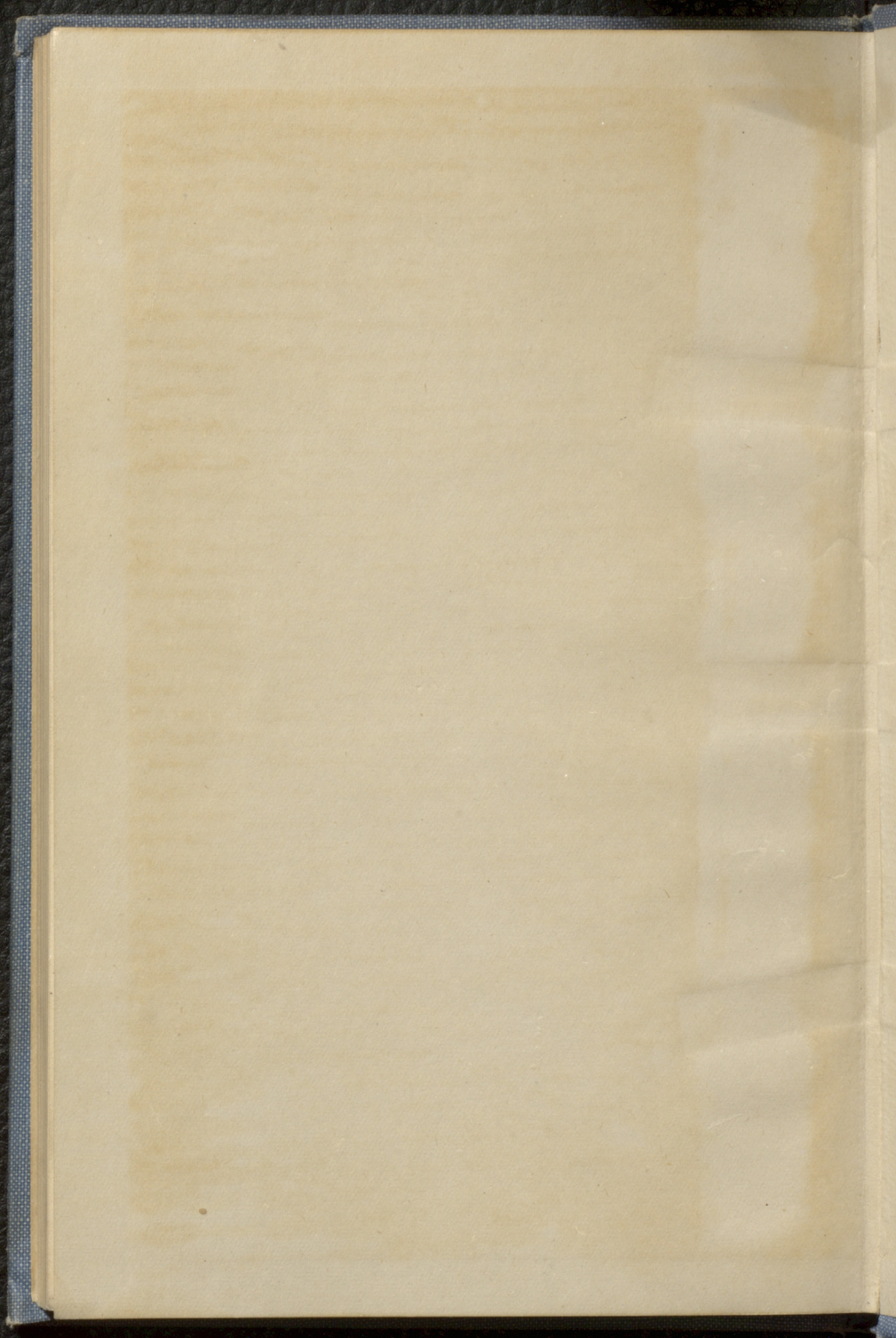
1. John A. Hunter, M.B.C.M. (Edin.), "Alcohol and Life."
2. Horsley and Sturge, "Alcohol and the Human Body."
3. Horsley and Sturge, "Alcohol and the Human Body."
4. John A. Hunter, M.B., C.M. (Edin.), "Alcohol and Life."
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9. Horsley and Sturge, "Alcohol and the Human Body."
10. Courtenay C. Weeks, M.R.C.S., L.R.C.P., "Physical Fitness."
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12. Medical Research Council, "Alcohol: Its Action on the Human Organism."
13. Horsley and Sturge, "Alcohol and the Human Body."
14. Medical Research Council, "Alcohol: Its Action on the Human Organism."
15. Medical Research Council, "Alcohol: Its Action on the Human Organism."
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17. W. A. Chapple, M.D., Ch.B., M.R.C.S., D.P.H., "Alcohol and Self-Control" (Abbridged).
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19. Courtenay C. Weeks, M.R.C.S., L.R.C.P., "Physical Fitness."
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21. Medical Research Council, "Alcohol: Its Action on the Human Organism."
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37. Professor James, "Psychology."
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41. Horsley and Sturge, "Alcohol and the Human Body."









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